

(No Model.)

2 Sheets—Sheet 1.

J. I. HERRICK.
HAND PROPELLED VEHICLE.

No. 433,202.

Patented July 29, 1890.

Fig. 1.

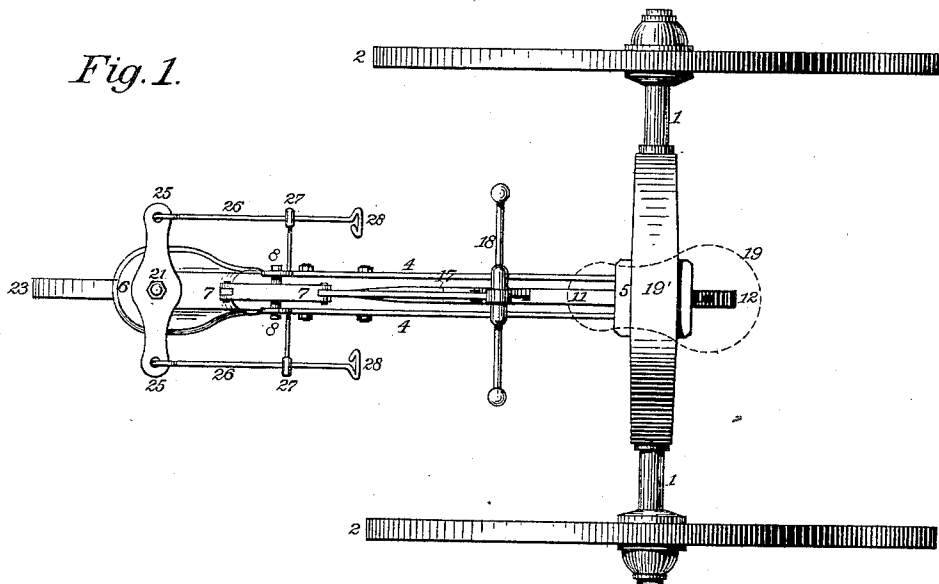
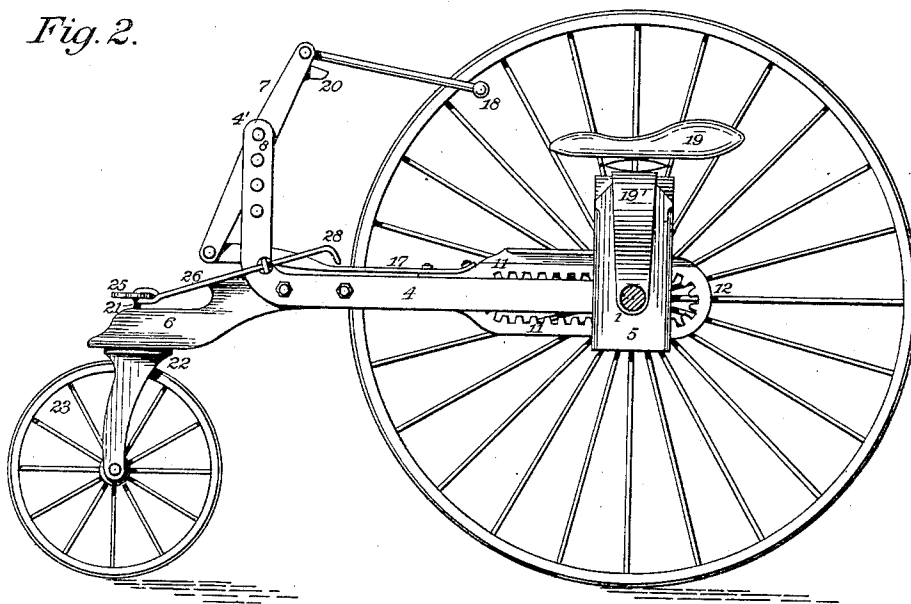


Fig. 2.



Witnesses:

Arthur D. Bryant,
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Inventor:

John I. Herrick.
By his Atty.
Edwin Bros.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

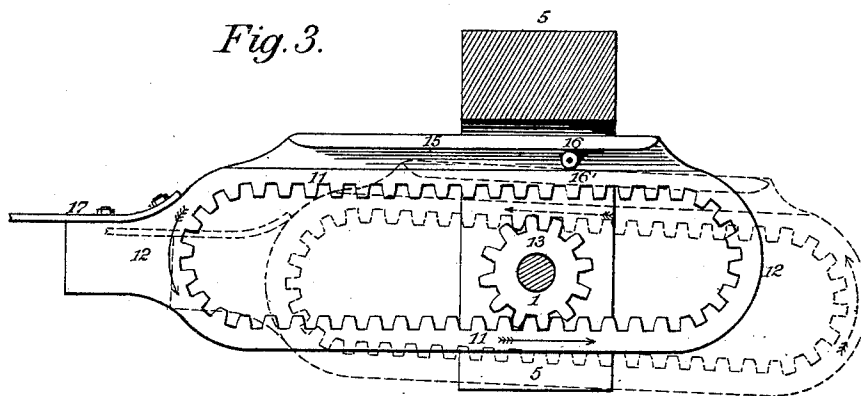


Fig. 4.

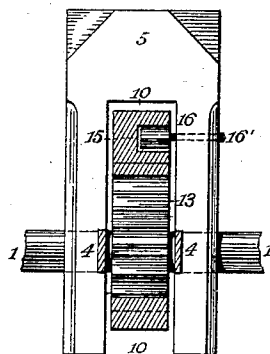


Fig. 5.

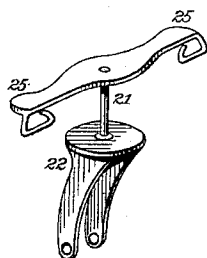


Fig. 6.

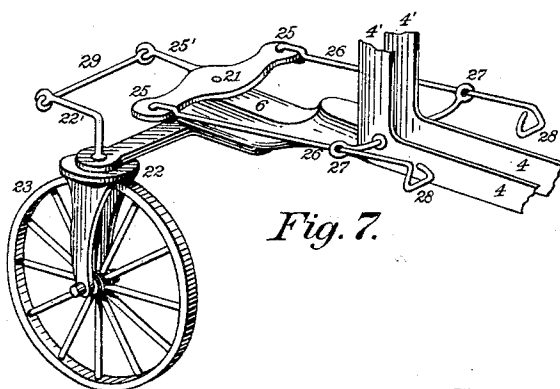
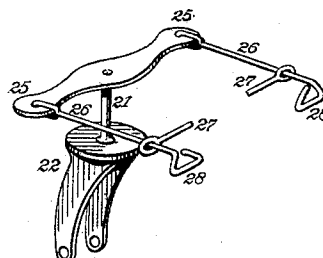


Fig. 7.

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UNITED STATES PATENT OFFICE.

JOHN I. HERRICK, OF MANSTON, WISCONSIN.

HAND-PROPELLED VEHICLE.

SPECIFICATION forming part of Letters Patent No. 433,202, dated July 29, 1890.

Application filed November 14, 1889. Serial No. 330,372. (No model.)

To all whom it may concern:

Be it known that I, JOHN I. HERRICK, a citizen of the United States, residing at Manston, in the county of Juneau and State of Wisconsin, have invented certain new and useful Improvements in Hand-Propelled Vehicles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of my invention is to provide a hand-propelled vehicle or tricycle with mechanism which enables the rider to propel or operate the vehicle with a motion which brings into action or play the muscles of the body, shoulders, and arms similar to the "rowing" motion in rowing a boat, thus providing a form of exercise which is most healthful and invigorating.

My invention has further for its object to provide a simple and inexpensive contrivance by which a single lever is adapted to drive the axle and carrying wheel or wheels of the machine continuously in one direction and to provide for guiding the machine by the feet or lower extremities of the rider, which guiding means also serve as a brace for the rider when operating the lever to propel the machine.

With these and other objects in view I employ a horizontal axle, upon which is keyed or otherwise rigidly secured one or both of the carrying-wheels of the machine or vehicle. This axle passes through a vertically-slotted upright rear end of the frame of the machine, and in the slot of this upright end is fitted a reciprocating driving-rack, which operates to rotate a pinion on the axle continuously in one direction. This rack consists of two parallel sides or bars and segmental ends, which join the sides, thus forming an oblong frame with rounded ends, and the inner opposing faces of the parallel sides and segmental ends are provided with gear-teeth, with which is adapted to mesh the pinion on the axle. The rack is capable of a limited vertical movement or play at the end of each of its reciprocating movements, whether forward or backward, in order that when the pinion has traveled to the end of one side of the rack it may

engage with the corresponding end of the other side or bar of the rack, and this change of position of the rack with relation to the gear wheel or pinion is effected partly by the engagement of the pinion with the toothed segmental ends of the rack when the latter is at the limit of its movement or stroke in either direction. The rack when in its elevated or depressed position and while moving endwise in its reciprocating movement is confined to such position by positive guide devices in order to prevent the pinion or gear from becoming disengaged with the side of the rack with which it is designed to engage, according to the position of the rack, and as the simplest form of such guiding means for the rack I prefer to employ a loose friction roller or sleeve mounted on a stationary stud in the supporting-frame, said friction-roller riding on the upper edge of the rack when the latter is lowered so that the pinion gears with the upper side of the rack; but when the rack is elevated to cause the pinion to mesh with the lower side of the rack the guiding friction-roller rides in a longitudinal way or guide on the rack.

By constructing the rack and adapting it for service in the manner described I am enabled to provide a simple, efficient, and reliable contrivance for converting the motion of the reciprocating lever into rotary motion, so as to continuously drive or rotate the pinion or gear on the axle continuously in one direction and without the employment of ratchet and other complicated mechanism, which is liable to get out of order and is expensive to repair.

The frame of the machine preferably consists of two parallel bars, the vertical or upright part at the rear end, as described, and a head-block rigidly united or secured to the front end of said frame, the parallel bars being bent or turned upward to form supports for the vertical operating-lever. This lever is fulcrumed on a shaft or pin, which passes through the lever at a point intermediate of its length, and the lower end of said lever is connected to the forward end of the reciprocating rack. To the upper end of the lever is pivotally connected a handle-bar, which extends rearward from the lever and is with-

in convenient reach of the operator seated on the machine, and said handle-bar is sustained in a horizontal position, so that it can be conveniently grasped by the rider, by means of a horizontal rigid arm on the lever below the fulcrum of the handle-bar. The propelling-lever is adjustable vertically on the upright portions or arms of the parallel bars of the frame in order to vary the power of the lever.

The guiding-wheel of the machine is carried by a frame having a vertical spindle, which is journaled in the head-block of the main frame, and to the upper extremity of the spindle is fixed a transverse bar, against which the feet or lower extremities of the rider are applied in order to guide the machine and to serve as a brace for the rider. This transverse bar may have stirrups rigidly secured to the ends of the same, or, if desired, sliding push-rods may be pivotally connected to the ends of the bar, said push-rods sliding in fixed guides on the head-block of the main frame and extending rearward within convenient reach of the rider, the free ends of said push-rods being provided with stirrups or other suitable rests for the feet.

To enable others to more readily understand my invention, I will now proceed to a detailed description thereof in connection with the accompanying drawings, in which—

Figure 1 is a plan view of my improved hand-propelled vehicle or tricycle. Fig. 2 is a side elevation thereof. Fig. 3 is an enlarged detail view of the propelling mechanism, and Fig. 4 is a cross-section view of the propelling mechanism. Fig. 5 is a detail view of one form of foot steering appliance, and Figs. 6 and 7 are further modifications of the same.

Referring to the drawings, in which like numerals of reference denote corresponding parts in all the figures, 1 designates the axle of the vehicle, upon which is fitted the carrying-wheels 2, one or both of which wheels may be keyed or otherwise rigidly secured to the axle, or one wheel may be fixed on the axle to turn therewith and the other loose thereon, as may be preferred.

3 is the main frame, which consists of the parallel bars 4 4, the vertical or upright rear part 5, and the head-block 6, the upright rear part of the frame having the rear ends of the bars rigidly united thereto, while the head-block is secured in like manner between the front ends of said bars, as shown. The front ends of the parallel bars are bent upwardly to form the vertical arms 4' 4', which serve as the supports for the propelling-lever 7, which is arranged between said bars and supported by a pin or shaft 8, which is fitted in aligned openings in said arms 4' 4' of the frame, a series of such openings being provided for the purpose of adjusting and varying the power of the lever, as shown.

The axle 1 passes loosely through a transverse opening at or near the middle of the upright rear end 5 of the main frame, and in said part 5 of the frame is formed a vertical

slot 10, which is in line with the space between the bars 4 4 of the frame. In the space between said bars and in the slot 10 of the upright rear end of the frame is arranged a rack 11 12, which is adapted to be reciprocated or moved endwise by the propelling-lever 7. This rack consists of two parallel sides or bars 11 and the segmental ends 12, which are united to the sides or bars and made continuous therewith, so as to provide a frame which is nearly rectangular and formed with rounded ends. The inner or opposing faces of the sides and ends of this reciprocating rack are formed or provided with gear-teeth, and with said rack meshes a gear wheel or pinion 13, which is rigidly fastened to the axle 1, said gear wheel or pinion being located on the axle within the vertical slot of the rear end of the frame and between the sides and ends of the reciprocating rack. This reciprocating rack is provided with a longitudinal guide or way 15, which may be formed either by cutting or otherwise providing a slot in one side or face of the rack or by making parallel flanges or ribs thereon, and in this guide or way fits a friction roller or sleeve 16 when the reciprocating rack is elevated so that the lower bar or side of said rack engages with the gear or pinion, the friction-roller being loosely fitted on a rigid stud 16' fixed on the upright rear end 5 of the main frame within the slot of said part 5, as shown in Fig. 3.

The reciprocating rack is connected to the vertical propelling-lever by a connecting rod or bar 17, which is preferably united rigidly to the front end of said rack and pivotally connected to the lower end of the lever, whereby the lever serves to move the rack back and forth as the lever is operated. To the upper end of the lever is pivotally connected a handle-bar 18, which extends rearward from the lever and within convenient reach of the rider occupying the seat 19 on the machine, and this handle-bar is sustained in proper position to be grasped by the rider by means of a supporting-arm 20, which is secured to or formed on the upright lever at a point below the pivot of said handle-bar. The handle-bar can be raised out of the way when the rider desires to mount or dismount the machine, and it is sustained in place on the horizontal fixed arm on the lever when it is lowered.

The seat 19 is supported by a bow or arch 19', which is connected at its ends to the axle and spans the upright rear end 5 of the main frame, to which part said arch is connected in any suitable manner; but it is obvious that the seat can be supported in any desirable manner without departing from the spirit of my invention.

The head-block 6 of the main frame 3 depends from and projects forward beyond the longitudinal bars 4 4 of said frame, and in this depending end of the head-block is journaled a vertical spindle 21, which projects vertically from a frame 22, which carries the

guiding or steering wheel 23, the axle of said wheel 23 being suitably mounted in the bifurcated ends of the frame.

The vertical spindle of the frame for the steering-wheel projects upwardly through the head-block, at which point a transverse bar 25 is rigidly secured to the spindle. This transverse bar is secured centrally to the spindle, and at its ends said bar is provided with stirrups or other suitable rests for the feet or lower extremities of the rider.

In lieu of applying the stirrups or other rests directly to the ends of the transverse bar, I may employ push-rods 26, which are pivotally connected to the transverse bar and fitted to slide freely in suitable fixed guides 27 on the head-block 6 of the frame 3. These push-rods extend rearwardly from the transverse bar within convenient reach of the rider, and at their free ends they are provided with the rests or stirrups for the feet or lower extremities of the rider.

The operation of my invention is simple, apparent from the foregoing description, and may be briefly summed up as follows: The rider places the feet or lower extremities on the stirrups or other rests of the transverse bar attached to the steering-wheel and grasps with the hands the head of the handle-bar attached to the lever. This handle-bar is capable of a slight vertical movement, as well as a horizontal movement, as it is shoved back and forth by the rider, and this motion is highly desirable, as it brings into action the whole trunk or body of the rider, as well as the arms, thus insuring a rowing motion, which, as is well known, is one of the best and most healthful forms of exercise. The rocking of the propelling-lever back and forth on its fulcrum serves to reciprocate the rack, which in turn operates to rotate the gear or pinion continuously in one direction. When the rack is moved forward by drawing the upper end of the propelling-lever rearward toward the rider, said rack is lowered so that the gear or pinion engages the upper side or bar thereof, and the friction-roller rides on the upper edge of the rack to depress the latter and hold it in engagement with the pinion or gear; but when the rack completes its forward movement its rear end clears the friction-roller, and the rear segmental end 12 of said rack engages the pinion, which thus serves to elevate the rack slightly so that the pinion is disengaged from the upper side of the rack and engaged with the lower side or bar thereof, in which position the rack is in condition to begin its rearward movement, and the friction-roller fits in the longitudinal guide of the rack to hold the latter in an elevated position and in gear with the lower side of the rack. When the handle-bar and lever are forced forward away from the rider, the rack is pushed rearward to rotate the pinion in the same direction as it was previously rotated by engagement with the upper

side of the rack, and upon completion of the rearward movement of the rack the friction-roller is disengaged from the longitudinal guide or way of the rack and the latter automatically lowered so that its upper side or bar again engages with the gear or pinion on the axle. It will thus be seen that I provide simple and effective means for rotating the axle continuously in one direction from a single operating-lever, and that I obviate the use of ratchets and other complicated mechanism, which is liable to get out of order.

The machine is steered or guided by foot-power, and the steering appliance also serves as a means for bracing the rider by applying the feet or lower extremities against the transverse bar.

It is obvious that the segmental ends of the reciprocating rack can be dispensed with and other appliances substituted therefor to automatically lower and raise the rack at the end of its backward and forward movement.

It may sometimes be desirable to locate the steering-wheel in line with but in advance of one of the carrying-wheels of the machine, and in Fig. 5 I have illustrated one means of accomplishing this end. In the depending head-block of the main frame I provide a vertical spindle, which carries at its upper end a transverse foot-bar, and from this spindle extends a bar or arm, to which is linked a rod, which extends to and is connected to the spindle of the guiding-wheel frame, whereby a movement of the foot-bar on the spindle of the head-block serves to turn the steering-wheel in the desired direction. With the parts arranged and combined in this manner the steering-wheel is in line with one of the carrying-wheels, and the wheels of the machine make only two tracks in lieu of three.

I am aware that changes in the form, proportions of parts, and details of construction and arrangement can be made without departing from the spirit or sacrificing the advantages of my invention, and I would therefore have it understood that I reserve the right to make such changes and alterations as fairly fall within the scope of my invention.

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

1. In a tricycle, substantially as described, the combination of a frame having a vertically-slotted rear end, an axle passing through said slotted end and having a gear-pinion, a rack guided within the frame and the slotted rear end thereof and provided with a longitudinal guideway, and a guide-pin or roller arranged and supported within the slotted part of the frame and adapted to ride on the guideway of the rack, for the purpose described, substantially as set forth.

2. In a tricycle, the combination of a frame having the parallel longitudinal bars and the vertically-slotted rear end rigidly united to the bars with its slot in line with the space

- between the bars, a longitudinal rack fitted between the bars and in the slot of the rear part of said frame and provided with a longitudinal groove, the lever fulcrumed on the frame and connected to the front end of the rack, and a friction-roller or pin supported and arranged within the vertical slot of the rear part of the frame, all arranged and combined substantially as described.
3. In a tricycle, the combination of a frame, a vertical propelling-lever 7, fulcrumed on a horizontal shaft in said frame to swing back and forth, an axle having a gear-pinion, a rack to which the lower end of the lever 7 is pivoted, and a handle-bar pivoted to the upper end of the lever 7 and supported when at rest in a horizontal position by a fixed arm or part on the lever, substantially as described.
4. In a hand-propelled vehicle, a frame consisting of the parallel bars which are formed at one end into upright supporting-arms, a vertically-slotted rear part united to said bars, and a cross-head fixed to the front ends of said bars, in combination with an axle having a gear-pinion, a reciprocating rack operating in the slot of the rear end of the frame and between the parallel bars thereof, a lever fulcrumed between the upright arms of said frame and connected to the rack, and a steer-

ing-wheel journaled in the cross-head, substantially as described.

5. In a hand-propelled vehicle, the combination of a main frame having a depending head-block at its front end, a steering-wheel, a frame in which said steering-wheel is journaled and provided with a vertical spindle fitted in the head-block, and a transverse bar secured rigidly to said spindle and provided with stirrups for the feet or lower extremities of the rider, substantially as and for the purpose described.

6. In a hand-propelled vehicle, the combination of a main frame having a depending head-block, an adjustable frame carrying a steering-wheel and provided with a vertical spindle which is fitted in said head-block, a transverse bar rigidly secured to the spindle, and push-rods pivotally connected to the transverse bar and sliding loosely in fixed guides on the head-block or main frame of the machine, substantially as described.

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

JOHN I. HERRICK.

Witnesses:

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DUANE MOWRY.