(No Model.) 5 Sheets—Sheet 1.

E. W. WOOD & C. E. BURNAP.

VELOCIPEDE.

No. 439,922. Patented Nov. 4, 1890.

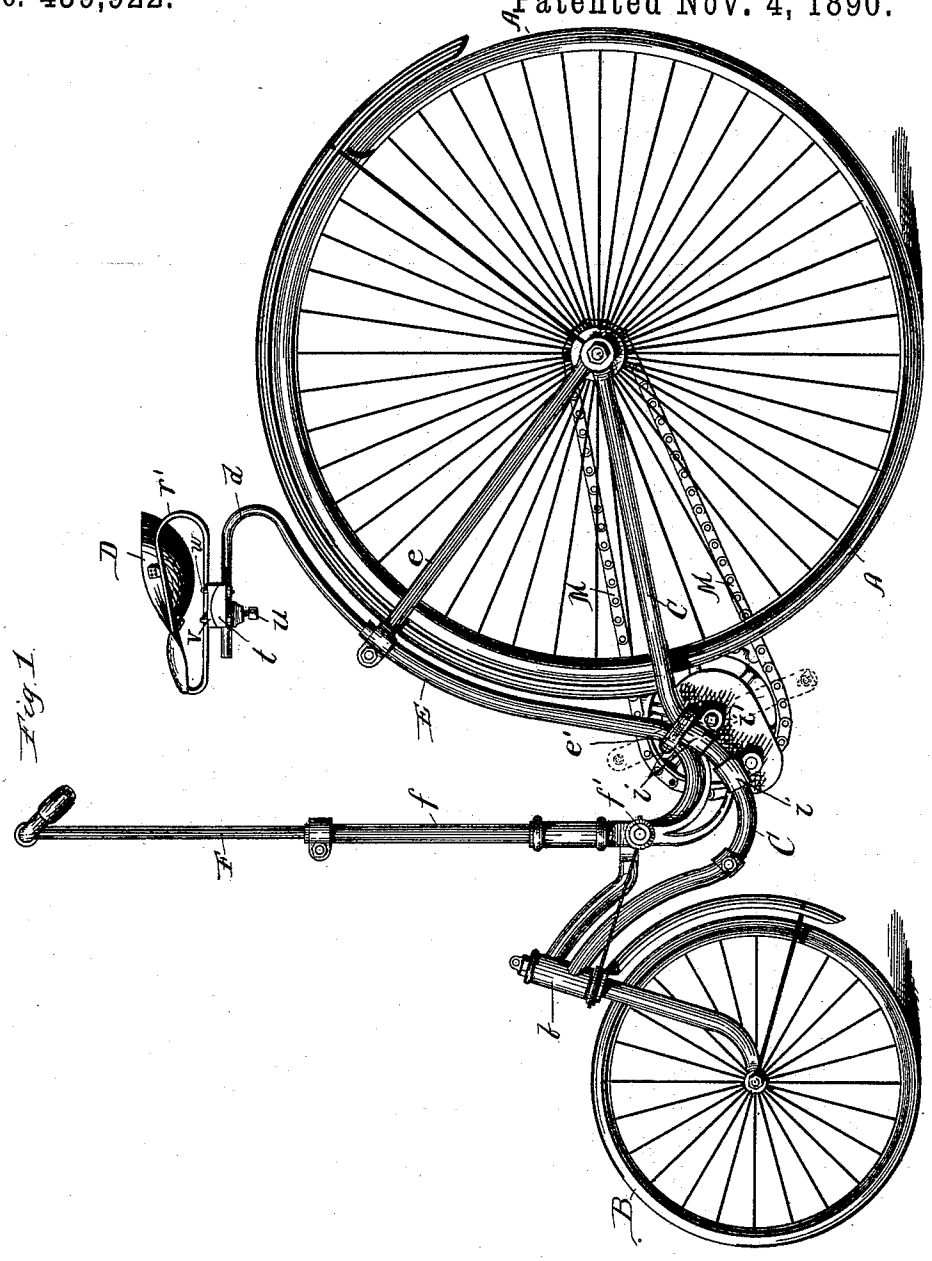


Fig. 1.

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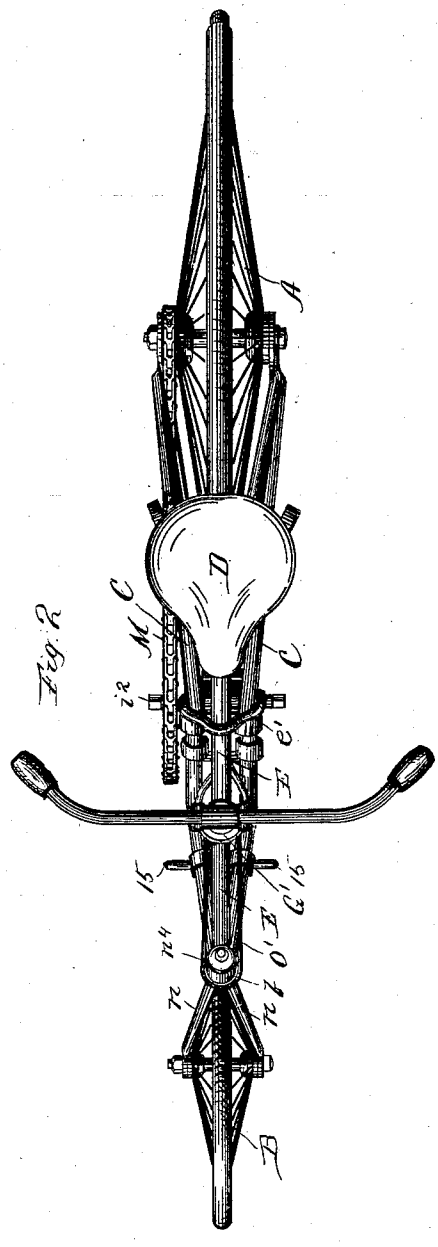
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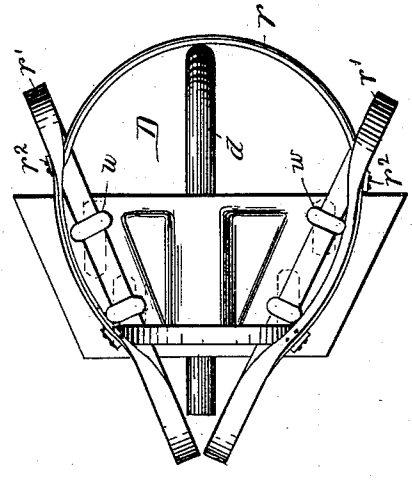
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VELOCIPEDE.

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VELOCIPEDE.

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Fig. 3.

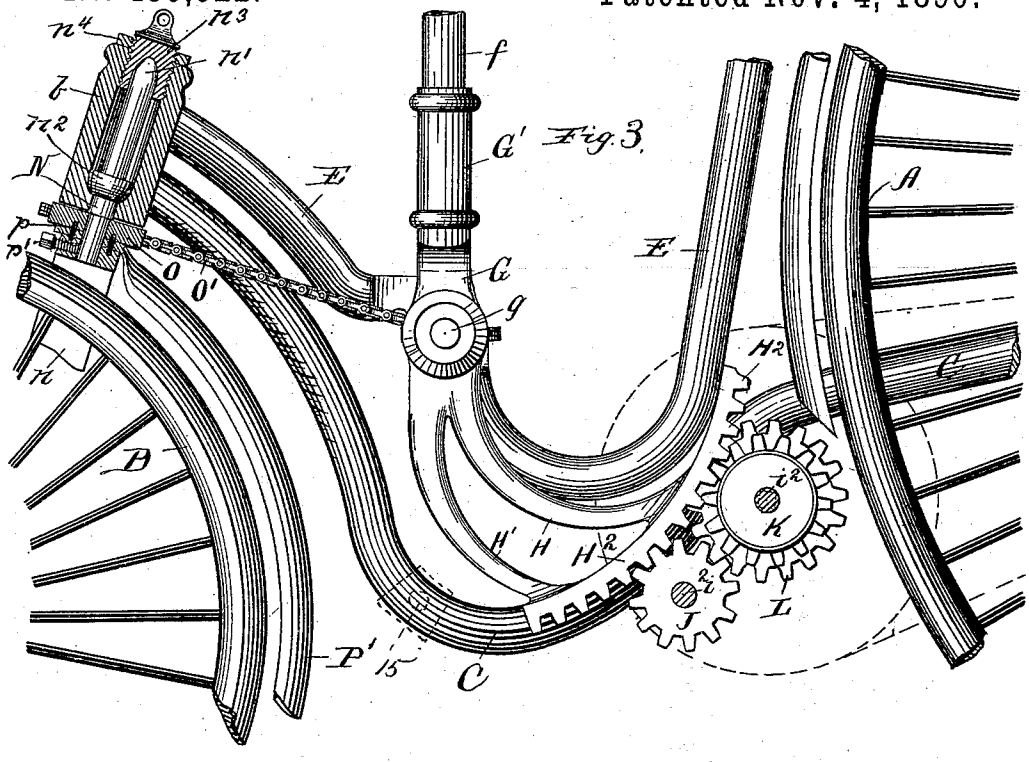
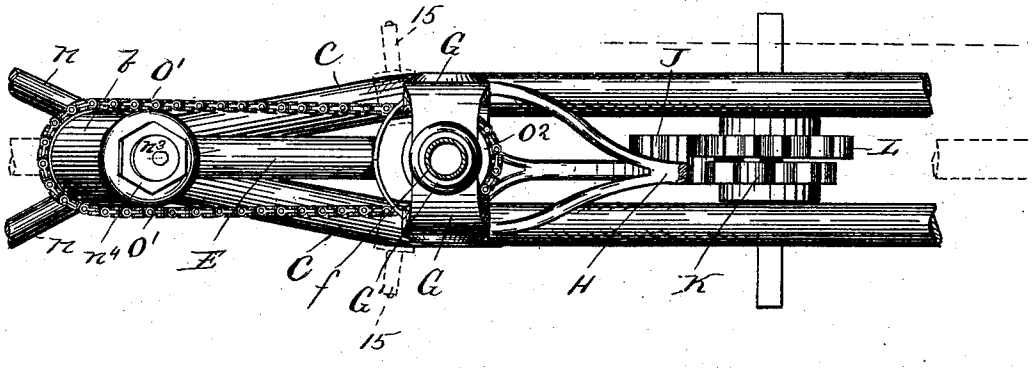


Fig. 4.



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VELOCIPEDE.

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Fig. 5.

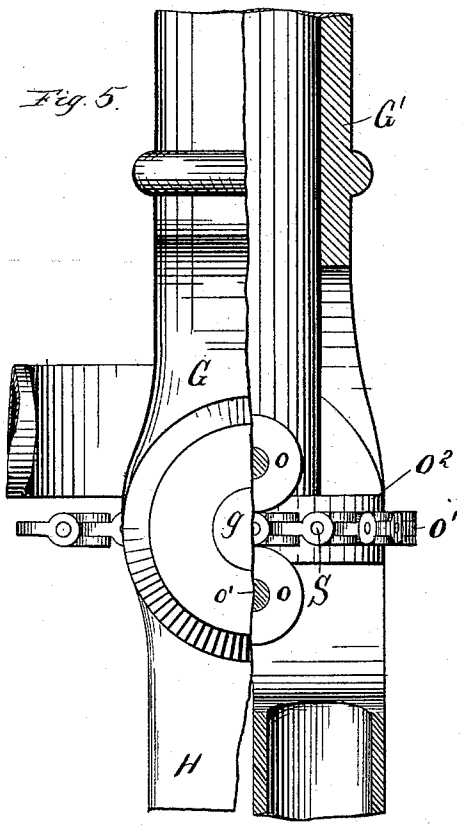


Fig. 6.

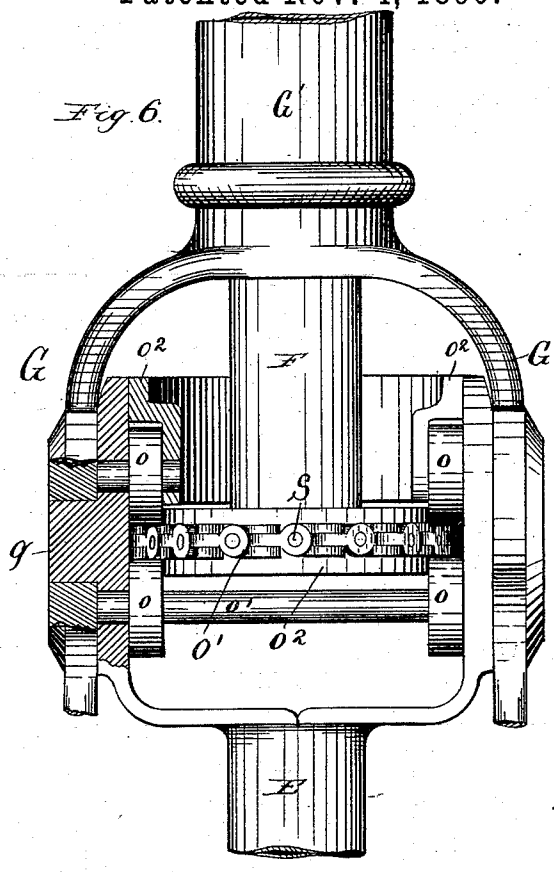
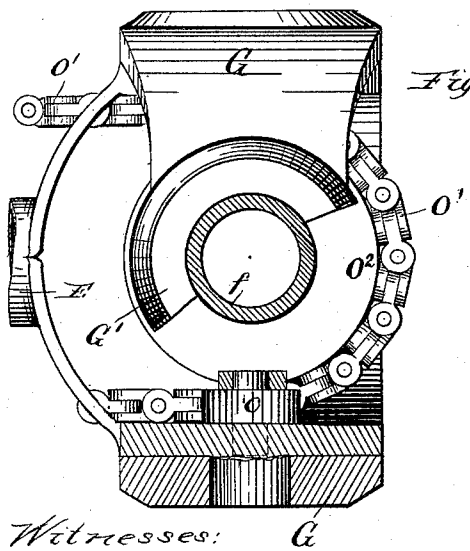


Fig. 7.



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E. W. WOOD & C. E. BURNAP.

VELOCIPEDE.

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Fig. 8.

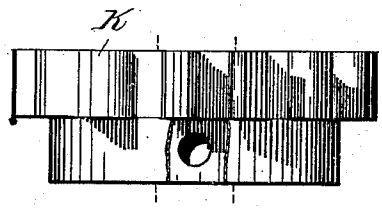
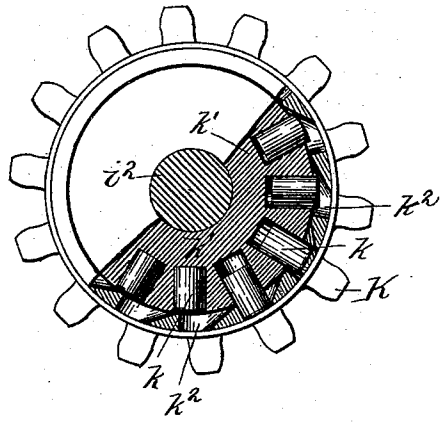


Fig. 9.



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UNITED STATES PATENT OFFICE.

ELLERY W. WOOD AND CHARLES E. BURNAP, OF CHICAGO, ILLINOIS.

VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 439,922, dated November 4, 1890.

Application filed November 11, 1889. Serial No. 329,959. (No model.)

To all whom it may concern:

Be it known that we, ELLERY W. WOOD and CHARLES E. BURNAP, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Bicycles and Similar Vehicles, of which the following is a specification.

This invention has for its object the devising of a practical and simple form of bicycle which may be propelled by the hands through power applied to a lever which also serves as a means by which the vehicle may be steered; and our principal endeavor in the invention has been to make this propelling-lever serve the double purpose stated. We thus provide a form of bicycle or similar pleasure-vehicle wherein the arms of the rider are exercised, and which is adapted to those who cannot, for physical reasons, operate pedals with their feet.

The nature of our invention as well as the details thereof we have shown in the accompanying drawings, and to them we now refer, the points of the invention being set out in claims hereunder written.

In said drawings, Figure 1 represents a side elevation of our improved machine. Fig. 2 is is a plan thereof. Fig. 3 is an enlarged partial side view, partly in section. Fig. 4 is a horizontal section of the parts shown at Fig. 3. Fig. 5 is a vertical elevation, partly in section, of a part of the propelling-lever. Fig. 6 is a rear elevation of said lever, also partly in section. Fig. 7 is a horizontal section thereof. Figs. 8 and 9 are edge and side views, respectively, of one of the clutch-gears actuated from the propelling-lever, Fig. 9 being partly in section. Fig. 10 is an enlarged plan of the seat-frame.

In said drawings, A represents the driving-wheel, and B the steering-wheel of the bicycle or other vehicle, connected by any suitable frame-work. The construction of such connecting-frame which we prefer, is illustrated in the drawings, and consists of the side pieces C, joined at their rear ends to the axle of the driving-wheel, and at their front ends to the sleeve *b*, in which the head or post of the steering-wheel is supported. The seat D is supported upon arm *d*, telescoping in an inclined standard E, which is braced from the axle of the driving-wheel by the braces *e*, and extends down into proximity to the side bars C, to which it is coupled by a band *e'*, and from thence extends forward to a junction with the sleeve *b*. The intermediate portion of the part E, between the latter two points, supports the propelling-lever. This standard E we prefer to make of piping, and it may be made in one piece and preferably is so made, being split and spread at the point where it receives the bearing of the propelling-lever, as hereinafter stated.

The propelling-lever may consist of a rod F and a piece of tubing *f*, the former being adjustable in the latter, so the height of the handles may be changed to suit different riders. At the point *f'* the lever is provided with a universal bearing, so that it may be oscillated forward and backward in actuating the machine, and at the same time be capable of turning on its axis to give the proper direction to the steering-wheel. The first of these movements we obtain by providing the sides of the standard E at the point where such standard is spread or split to receive the propelling-lever with trunnions *g*, as illustrated particularly at Figs. 5, 6, and 7, such trunnions working in corresponding recesses formed in the side arms G, extending down from a supporting-sleeve G', through which the propelling-lever passes. The rotary or steering movement of the propelling-lever is obtained by the freedom which said lever has to turn in said sleeve G'.

In order to actuate the driving-wheel by the backward and forward movement of the propelling-lever, we provide upon the ends of extensions H and H' a segmental gear H^2, said extensions H and H' being in one piece with the part G, so that said segment is moved with each pulsation or stroke of the propelling-lever. Said segment meshes with and actuates in both directions gears J and K, and the former of these gears, which is a wide gear, drives a third gear L. These gears are supported upon journals which are sustained by hangers *i i* from the side bars C, and they are preferably covered by shields *i'*. Supposing these gears to be free to rotate, it will be seen that each time the propelling-lever is drawn

backward by the rider the gears J and K will be actuated in the same direction, while the gear L will be driven in the opposite direction; also, that when the stroke of the propeller-lever is from back to front the direction of movement of all of the gears will be reversed. From the gears K and L we drive their shafts i^2 continuously in the desired direction by providing those gears with clutches—such, for instance, as that illustrated at Figs. 8 and 9, and consisting of a number of gravitating dogs k, resting in sockets in a ring k', fast upon the shaft i^2, and entering interior recesses k^2 upon the inner surface of the rim of the gears, said recesses k^2 having sloping walls at one side and abrupt walls at the opposite side, as clearly shown at Fig. 9. There is preferably one less of the dogs k than there are of the recesses k^2, and it results from the construction described that whatever may be the position of the gear upon the shaft some of the dogs k will be in contact with the abrupt wall of a recess k^2, so that as soon and whenever either of the gears is driven in the proper direction to actuate the shaft, the dog so in position will communicate power to the shaft through the ring k', thus preventing any lost motion. At the same time as soon as the gear reverses its motion said dog will move freely out of the gear-socket and allow the gear to slip on the shaft. From this description it will be seen that one or the other of the gears K and L will at all times while the machine is in motion be applying power to the shaft i^2 and in a direction which allows of the driving of the driving-wheel through the medium of the sprocket-chain M, passing over sprocket-wheels upon the shaft i^2 and upon the axle of the driving-wheel, as clearly illustrated, thereby converting the oscillatory or changing movements of said gears into a continuous motion at the driving-wheel.

The manner of actuating the steering-wheel from the propelling-lever is as follows: The steering-wheel is supported from the post N by the branching arms n. Upon the post N is a small wheel or pulley O, receiving a chain O′, said chain also passing around the pulley or spool O^2, secured upon the lower end of the propelling-lever. It will now be seen that whenever the handle of the propelling-lever is turned so as to move the lever around its axis this chain will carry a similar movement to the steering-wheel. At the same time it will be noticed that whatever the position of the handle may be in its backward and forward path this actuation of the steering-wheel is possible. At each side of the wheel O^2, and immediately above and below the center upon which the lever moves in propelling the machine, we place rollers o, which serve to keep the chain O′ in its proper position. The two lower of these rollers may be upon the same shaft o'; but in that case of course either both or one of said rollers must be loose upon said shaft. The upper rollers may be provided with bearings in the sides of the standard E, and in brackets o^2, secured to said sides. The chain O′ is preferably secured to the pulley or wheel O^2—as, for instance, by extending one of the pivots S, joining the links of the chain, so that it may extend into the wheel at the central back portion thereof. The same provision to prevent the slipping of the chain may be made at the pulley O.

The steering-post N is provided with both an upper and a lower spherical conical bearing, as shown at n' and n^2, the sleeve b being provided with a seat to receive the latter and with a plug n^3 recessed to set down upon the end n'. This plug is threaded into the end of the sleeve, as shown, so that it may be adjusted therein to take up the wear, and it is held in its adjusted position by a set-nut n^4. To render rigid the attachment of the branching arms n and the wheel-guard P′ to the pulley O, thereby preventing any slipping of said pulley, which shall not actuate the steering-wheel and its guard, we pass small pins p through the end of the guard P′ into pulley O, and also into the union-piece of the branching arms, as at Fig. 3, and the parts are all attached to the head N by set-screw p'.

The seat consists of a flexible bottom of leather D, supported by a metal frame-work consisting of a horizontal circular piece of metal r and two vertical pieces r', the latter being bent to a loop form and the horizontal piece r being riveted thereto, as shown at r^2. The pieces r' we prefer to form of flat metal and to bend them at their junction with the horizontal piece, so that their edges will be uppermost, all as shown at Fig. 10. The parts r' act as springs to cushion the seat. As changes in the height of the seat will more or less affect its horizontality, we provide the seat with means by which its horizontal position may be maintained whatever vertical adjustment be given it. These means consist of a convex surface-plate t, secured to the arm d by the set-screw u, and the concave surface-plate v, setting down upon the plate t, and secured thereto by the same loop-bolts w by which the springs r' are held. The bolt-openings in the plate t, or in lieu thereof those in the plate v, are elongated, as indicated at Fig. 10, to permit such changes in position by the plate as may be necessary to preserve the horizontality of the seat.

In order to render the bicycle convertible into a foot-power machine, provision for the attachment of foot-pedals to the shaft i^2 is all that is requisite. Hence we square the ends of said shaft and thus adapt them to receive the pedals. (Shown by dotted lines in the drawings.) When using the machine as a foot-power machine, the clutches allow the gears to slip upon said shaft i^2, so that the le-

ver may be held stationary, with freedom, however, to turn in steering.

At 15 on the side bars C are found footrests to be used when the machine is actuated by hand.

We claim—

1. The combination, in a bicycle, of a driving-wheel, a steering-wheel, a stationary seat, a connecting-frame, a combined propelling and steering lever having a universal bearing at the frame, power-carrying connection from said lever to the driving-wheel, and other connections from said lever to the steering-wheel, substantially as set forth.

2. In a bicycle or similar vehicle, a combined propelling and steering hand-lever carrying a toothed segment, in combination with the driving-wheel, gearing driven by said rack and having a clutch-connection with a sprocket-wheel, a chain connecting said sprocket-wheel with the driving-wheel, a steering-wheel, and a flexible connection carrying motion from the lever to the post of the steering-wheel, substantially as set forth.

3. In a bicycle or similar vehicle, the combination of a hand propelling-lever, with the driving-wheel, the gears actuated by the lever, the clutches for converting the changing motion of the gears to a continuous motion in one direction, and the sprocket-chain for carrying motion from the gears to the driving-wheel, substantially as set forth.

4. In combination with the hand propelling-lever carrying a segmental gear, the gears J, K, and L, the two latter mounted upon the same shaft and having clutch-connections therewith, and the chain for carrying power from said gear-shaft to the driving-wheel, substantially as set forth.

5. The combination, with the segmental gear, of the gears J, K, and L, the two latter mounted upon the same shaft and having clutch-connections therewith, substantially as set forth.

6. The combination, with the hand propelling-lever, of the segment-gear, the gears J, K, and L, and clutch-connections, essentially such as described, between the gears K and L and their shaft, whereby the changing motions of the gears are converted into a continuous rotation in one direction, substantially as set forth.

7. The combination, with a hand-lever, of the segmental gear, the gears J and K, meshing with said segment, the gear L, meshing with the gear J and located upon the same shaft with gear K, and the clutch-connections between gears K and L and their shaft, substantially as set forth.

8. The hand propelling-lever supported in a sleeve G′, having arms G, in combination with the standard E, upon the sides of which said arms G are pivoted, substantially as set forth.

9. The steering-wheel and its post N, the latter having upper and lower conical bearings n' and n^2, in combination with sleeve b, having a seat to receive the latter bearing, and recessed plug n^3, setting down on the end n', substantially as set forth.

10. The combined propelling and steering lever, in combination with the steering-wheel, and a flexible connection between the lever and the post of said wheel, joined to the lever at its center of oscillation, substantially as set forth.

11. The combination, with the steering-wheel post, of the chain-pulley O, the wheel-guard P′, and the branching arms n, attached to said post and to each other, substantially as set forth.

12. The combination, with the steering-chain and the propelling-lever, of the rollers o, substantially as set forth.

13. The propelling-lever, in combination with a sleeve through which it passes and in which it is supported with freedom to turn on its axis, said sleeve being supported by stationary bearings permitting backward and forward oscillation, substantially as set forth.

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