No. 627,680. Patented June 27, 1899.

W. E. BROCK.

DRIVING AND STEERING MECHANISM FOR CYCLES.

(Application filed Oct. 7, 1898.)

(No Model.) 2 Sheets—Sheet 1.

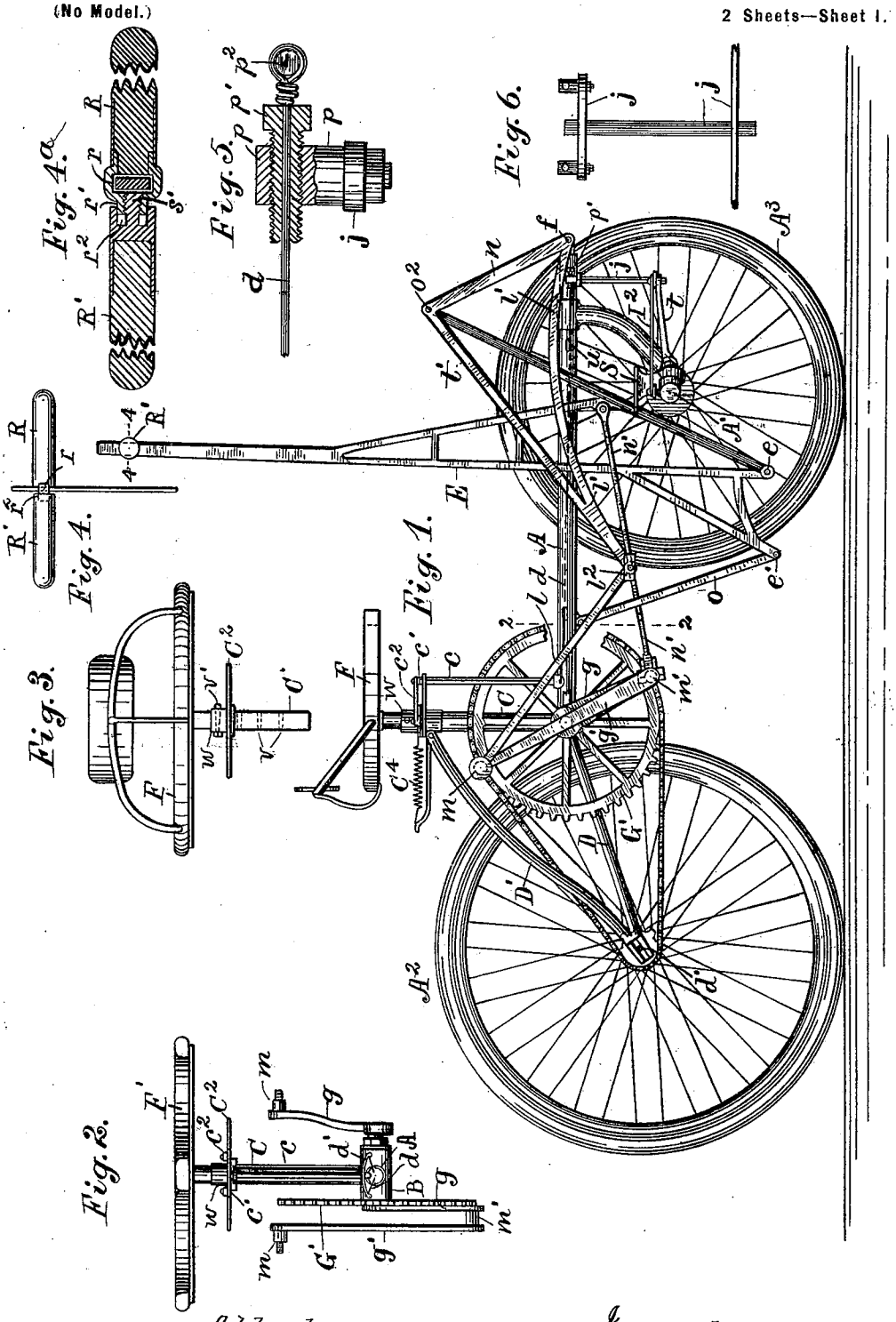


Fig. 4a.

Fig. 5.

Fig. 6.

Fig. 4.

Fig. 1.

Fig. 3.

Fig. 2.

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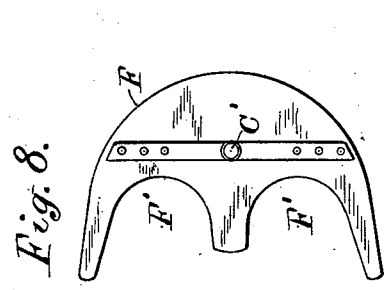
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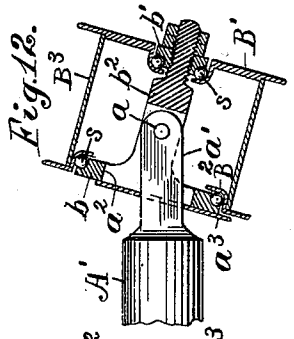
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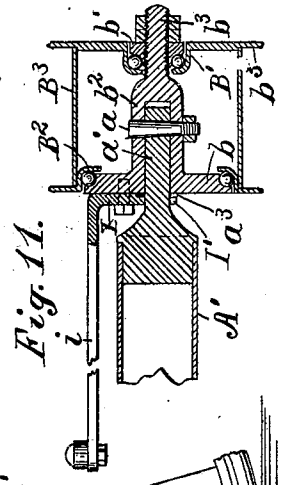
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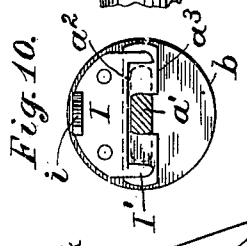
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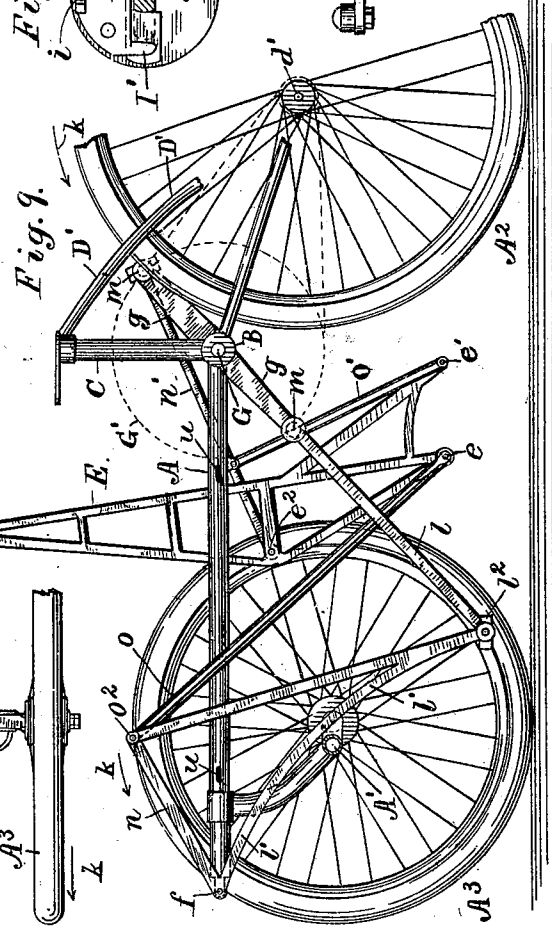












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UNITED STATES PATENT OFFICE.

WILLIAM E. BROCK, OF PLAINFIELD, NEW JERSEY.

DRIVING AND STEERING MECHANISM FOR CYCLES.

SPECIFICATION forming part of Letters Patent No. 627,680, dated June 27, 1899.

Application filed October 7, 1898. Serial No. 692,909. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. BROCK, a citizen of the United States, residing at Plainfield, county of Somerset, State of New Jersey, have invented certain new and useful Improvements in Driving and Steering Mechanism for Cycles, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The present improvements relate partly to the means for turning the steering-wheel of a bicycle by connection with a vertically-pivoted seat, partly to the means for pivoting the steering-wheel upon the end of a fixed axle, partly to a toggle connection between the pedal and the driving-crank, partly to a a double-fulcrumed hand-lever connected to the driving-crank, and partly to a frame built upon a single horizontal frame-bar for supporting the said mechanism effectively.

The invention will be understood by reference to the annexed drawings, in which—

Figure 1 is a side elevation of a tricycle embodying the invention with a part of the sprocket-wheel broken away. Fig. 2 is an elevation of the seat and part of the steering and driving gear, including a section through the main frame-bar A on line 2 2 in Fig. 1. Fig. 3 is rear elevation of the seat with its spindle and attachments. Fig. 4 is an edge view of the hand-lever, at the top, with the handle attached. Fig. 4ª is a cross-section of the handle, taken on line 4 4 in Fig. 1. Fig. 5 is a detailed view of the tightener for one of the steering-wires, and Fig. 6 is a front elevation of the lever-frame with the ends of the lower arms broken off for want of room upon the drawings. Fig. 7 is a plan of the tricycle with the seat indicated by dotted lines only and its spindle C′ shown in section in the seat-post tube. Fig. 8 shows the under side of the seat with its spindle. Fig. 9 is an elevation of the frame with the driving mechanism only, which is represented in the extreme opposite position from that shown in Fig. 1 and the machine viewed from the opposite side, with the rear driving-wheel partly broken away for want of space upon the drawings. Fig. 10 shows the inner or slotted cone upon one of the steering-wheel hubs, with the head upon the supporting cross-bar in section adjacent to the hub. Fig. 11 is a vertical section of the hub, with its steering-arm and the adjacent end of the supporting cross-bar. Fig. 12 is a plan of the supporting end of the cross-bar, with a horizontal section of the hub. Fig. 13 is an elevation of the dust-guard detached from the slotted cone.

The frame of the machine is provided with a central horizontal bar A, having crank-shaft bearing B at its rear end, with a seat-post tube C projected upwardly therefrom. Rear braces D and D′ extend backwardly from such bearing and tube to support the rear-wheel axle d'. The crank-shaft G has sprocket-wheel G′, connected by chain G^2 with sprocket-wheel upon the hub of the driving-wheel A^2, and is provided upon its opposite ends with reverse-cranks g, having crank-pins m m', and one of such crank-pins is provided with a return-crank g', having a crank-pin m'. A transverse frame-bar A′ is attached rigidly to the front part of the bar A, below the same, and the steering-wheels A^3 are pivoted thereon. The cross-bar is stiffened by braces A^4. (Shown in Fig. 7 only.)

A transverse fulcrum-bolt f is supported upon the front end of the bar A, and links l' are pivoted to swing downwardly from its opposite ends. Links l are jointed to the free ends of the links l' and pivoted to the pins m upon the cranks g. Pedals l^2 are pivoted at the junction of the links l l'. A seat F is provided with a vertical spindle C′ to fit within the said post-tube C, and a collar upon the top of the tube is provided with a forwardly-projecting bearing for a vertical steering-shaft c, the lower end of which is journaled in the bar A.

The spindle C′ is formed, as shown in Figs. 1, 2, and 3, with an adjustable collar w, having arms C^2 upon opposite sides, which are coupled by links c^2 with the cross-head c' upon the top of the steering-shaft c. Fig. 7 shows spiral springs C^4, connecting the ends of the arms C^2 with a bracket C^3, sustained upon the tube C, and such springs serve to hold the seat normally in a central position, as indicated by the dotted lines F in Fig. 7.

The bracket C^3 is projected directly backward from the seat-post upon the center line of the machine, so that the rear ends of the springs are fixed to a stationary support upon

such center line, while their forward ends operate upon the arms C^2.

It is obvious that the rider when sitting upon the seat may place both feet upon the pedals l^2 and rotate the crank-shaft by moving the feet together up and down alternately, the lowest position of the pedals being shown in Fig. 9, while Fig. 1 shows them in almost their highest position.

The links operate as a toggle in which the pressure is applied to the middle to produce a tension at the ends, and such construction conveys to the crank-pin m a much greater pressure than that exerted directly by the foot. The power of the rider is thus increased, and the rear or driving wheel A^3 may be geared much higher than is common.

To reinforce the power of the feet, a hand-lever E is provided and is formed with two fulcra e and e' at the lower end. These fulcra are pivoted to suspension-rods o and o', the latter being hung from the frame-bar A, adjacent to the bearing B, and the rod o' being connected by a joint o^2 with a lever-arm n upon the link l'.

To make a light and strong construction, the link l' and lever-arm n are made integral with a third bar, (like a bell-crank;) but such third bar serves only to strengthen the construction. A link n' is connected with the crank-pin m' and with a pin e^2, fixed upon the hand-lever E, and the suspension-rods o and o' serve to hold the hand-lever in an approximately vertical position through the movement induced by the rotation of the crank-pin m'.

In Fig. 1 the hand-lever is shown remote from the tube C and would be drawn forcibly toward the seat F by the hands of the operator during the depression of the treadle to the position shown in Fig. 9. The lever E is provided with a cross-handle, which is adjustable upon its upper end to suit the convenience of the rider, and the lever is so proportioned as to produce upon the pin e^2 a pressure very much greater than that exerted by the hands of the operator.

As the steering-wheels are designed to be turned upon the ends of a rigid cross-bar, it is desirable that each of them should turn upon its own point of support directly beneath the center of the wheel, so as to offer the least possible resistance to their control by the seat of the rider. To make the steering-wheels A^3 turn upon their points of support, I form the inner ball-cone b of the steering-wheel, as shown in Figs. 10 to 12, with a slot a^2 and extend an arm b^2 from the ball-cone b within the hub at the side of the slot and provide the end of the cross-bar A' with a head a', pivoted upon such arm within the hub. The pivot a is preferably formed as a tapered pin with a nut upon the end, as shown in Fig. 11, and with such connection the head a' plays laterally within the slot, as shown in Fig. 12, when the head or wheel is turned. The wheel-hub is shown formed of tube B^3, with ball-races B^2 and B' upon its opposite ends, the outer cone b' and the nuts for adjusting the same being secured upon an extension b^3, which is formed integral with the arm b^2. The balls s are shown in the ball-races, and as the two cones are mounted upon the same pivot a the hub of the wheel is held firmly by the arm b^2.

To prevent dust from reaching the ball-races through slot a^2, a slide a^3 is placed over the slot and notched, as shown in Fig. 13, to embrace the head a', and such slide is held in place by lugs I' upon the foot I of a lever-arm i, which is bolted to the cone for turning the wheel.

A lever-frame j (shown detached in Fig. 6) is pivoted beneath the forward end of the frame-bar A, its upper end being journaled in the frame-bar and its lower end upon a bracket t, carried by the cross-bar A'. This frame is formed with a vertical spindle and lever-arms projecting at opposite sides upon the top and bottom, and the lower arms are connected by links I^2 to the lever-arms i upon the steering-wheels. The upper arms are connected by wires d with a cross-head d' upon the lower end of the steering-shaft c, which is clearly shown in Fig. 2, and to protect the wires from derangement they are conducted within the frame-bar A, being led into and out of the same by holes u.

The upper arms of the frame j are provided, as shown in Figs. 5 and 6, with swivel-bearings p, having each a threaded socket to receive a perforated set-screw p'. The wires d are extended through the central perforations in the set-screws and formed with a peculiar swivel-head to permit the screw to turn without twisting the wire. Such swivel-head is formed by wrapping the wire about a small block p^2 and then coiling it several times upon the neck of the wire adjacent to the block to form a shoulder against the outer side of the screw-head. Such shoulder permits the screw to be turned in either direction to tighten or slacken the wire without twisting the same.

The arrangement of the levers is such that the wires are crossed within the frame-bar, as shown in Fig. 7, which enables them to operate without drawing strongly against the inner sides of the bar. The steering-wheels turn with so little resistance when pivoted above their points of support that the rider is able to control the movements of the wheels with absolute certainty and is thus able, as experience has demonstrated, to guide the wheel under all conditions when moving at a high velocity.

To assist the rider in mounting the seat, a step S is attached to the cross-bar A' and is projected over the steering-arm i, which moves normally in the position where the rider's foot will be placed in order to mount.

It is obvious that the driving appliances are adapted for use upon a two-wheeled cycle, as the fork of the front wheel would bear

the same relation to the frame as the spindle of the lever-frame *j*, and the fork would therefore be turned (in steering the machine) by connection with the seat in the same manner as the lever-frame *j*. Such fork would take the place of the pivoting devices for the wheel-hub (shown in Figs. 11 and 12) and would be turned by arms projected from opposite sides of the fork, like the arms at the upper part of the lever-frame *j*.

It will be noticed in Figs. 1 and 9 that the frame-bar A is on a level with the crank-shaft bearing and offers, therefore, no more obstacle to the mounting and using of the machine than the drop-frame of an ordinary bicycle.

When the hand-lever E is in its forward position, as shown in Fig. 1, the machine may therefore be mounted and afterward propelled with equal ease by riders of either sex.

To permit the vertical adjustment of the cross-handle upon the lever E with facility, so that it may be varied, if necessary, while in use by the rider, I divide the handle at the middle and form the two shanks R and R′ with a socket and set-screw connection adapted to firmly clamp the lever while uniting the two parts of the handle together. Fig. 4 shows such jointed handle in elevation, while Fig. 4ª shows it in sectional plan, with the set-screw *s′* slackened and the lever in the middle of the socket *r*, so that the handle may be moved freely up and down upon the lever.

To stiffen the junction of the two parts of the handle and avoid the lateral strain upon the set-screw which is involved in working the lever, a cylindrical nozzle *r′* is formed upon the socket to receive the threaded hole for the set-screw, and a recess r^2 is formed upon the end of the shank R′, around the set-screw, so as to closely embrace such nozzle. When the set-screw is screwed firmly against the side of the hand-lever, such recess surrounds the nozzle *r′* and effectively resists the lateral pressure upon the shank R′. The handle is readily released by turning the shank R′ to slacken the set-screw, and the handle may thus be adjusted to suit the rider upon the hand-lever without employing any tools or necessitating the stopping of the machine, if in motion.

The seat is also made adjustable by providing a series of transverse holes *v* in the spindle C′ and fitting a collar *w* movably upon the spindle, with a bolt *v′* to intersect the holes *v*. The collar rests upon the top of the seat-post tube, which, as shown in Fig. 9, is also provided with a collar to support the load, and the bolt *v′* serves to hold the collar at any desired height upon the spindle. The arms C^2 are attached rigidly to the collar and are thus turned by the movements of the seat when actuated by the rider.

I have found that the above construction, which affords the use of both hand and foot power, greatly facilitates the operation of the bicycle at a high rate of speed.

Having thus set forth the nature of the invention, what is claimed herein is—

1. In a cycle, the combination, with the horizontal frame-bar A having crank-shaft bearing at its rear end, and seat-post tube C projected upwardly therefrom, braces D and D′ extended backwardly from such bearing and tube to support the rear-wheel axle, a seat having spindle pivoted in the seat-post tube, the transverse frame-bar A′ attached rigidly to the front of the frame-bar A, with a steering-wheel connected to each end of such frame-bar by a vertical pivot, and provided with a lever-arm *i* for turning such wheel, a lever-frame *j* upon the frame-bar A with link connections to the lever-arms *i*, a steering-shaft mounted in bearings parallel with the seat-spindle, cranks and links for coupling such spindle and shaft, crank-arms attached to such shaft, and wires extended from such crank-arms through the interior of the frame-bar A to the lever-frame *j*, to actuate the steering-wheels by the turning of the seat, substantially as herein set forth.

2. In a cycle having the connections for actuating the steering-wheel formed of wire, the means for tightening the said wire connections, consisting of the set-screw bearing *p*, the set-screw *p′* perforated upon its center, the block p^2, and the wire *d* extended through the screw, wrapped about such block, and coiled upon the neck of the wire to form a shoulder against the screw-head, substantially as herein set forth.

3. In a bicycle having a cross-bar upon the frame with steering-wheels pivoted upon its ends, the combination, with the wheel-hub, of a ball-cone *b* provided with a slot a^2, an arm b^2 extended within the hub from the ball-cone at the side of the slot, with a pivot *a* through the same, and a head *a′* upon the axle fitted to the slot and jointed upon the said pivot, substantially as herein set forth.

4. In a bicycle having a cross-bar upon the frame with steering-wheels pivoted upon its ends, the combination, with the wheel-hub, of its ball-cone *b* provided with a slot a^2, an arm b^2 extended within the hub from the ball-cone, at the side of the slot, with a pivot *a* through the same, a head *a′* upon the cross-bar fitted to the slot and jointed upon the said pivot, and a sliding dust-guard applied to the head and arranged to cover the slot in the different positions of the wheel, with means for holding the slide upon the cone, substantially as herein set forth.

5. In a bicycle having a cross-bar upon the frame with steering-wheels pivoted upon its ends, the combination, with the wheel-hub, of the ball-cone *b* provided with a slot a^2, an arm b^2 extended within the hub from the ball-cone, at the side of the slot, with a pivot *a* through the same, a head *a′* upon the axle fitted to the slot and jointed upon the said pivot, a sliding dust-guard applied to the head upon the outer side of the cone over the slot, and a lever-arm secured upon the cone,

for turning the wheel, and fitted to hold the slide movably over the slot, substantially as herein set forth.

6. In a cycle, the combination, with a horizontal frame-bar A with crank-shaft bearing B at its rear end, and seat-post tube C with seat sustained upon the same, of a crank-shaft with driving-wheel connected thereto and the shaft provided with reverse cranks and a return-crank having crank-pins m, m', as set forth, the fulcrum f upon the forward end of the frame, the links l, l', jointed together and connected at their ends respectively with the said fulcrum and the crank-pin m, a lever-arm n attached to the link l' and provided with the connecting-rod o, the rod o' hinged below the frame-bar A, the double-fulcrum hand-lever E having its fulcra pivoted respectively upon the rods o and o', and the link n' connecting the crank-pin m' with the hand-lever, above its fulcra, the whole arranged and operated substantially as set forth.

7. In a cycle having a vertical hand-lever with transverse handle adjustable vertically, the handle construction comprising the shank R provided with socket r having nozzle r' upon the side with threaded hole for a set-screw, and the shank R′ having the recess r^2 in the end to admit the nozzle, and set-screw s' projected from the bottom of the recess, substantially as herein set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM E. BROCK.

Witnesses:
E. L. DE CAMP,
THOMAS S. CRANE.

Corrections in Letters Patent No. 627,680.

It is hereby certified that in Letters Patent No. 627,680, granted June 27, 1899, upon the application of William E. Brock, of Plainfield, New Jersey, for an improvement in "Driving and Steering Mechanism for Cycles," errors appear in the printed specification requiring correction as follows: Page 3, lines 102, 111, and 124, the word "bicycle" should read *cycle;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 29th day of August, A. D., 1899.

[SEAL.]

WEBSTER DAVIS,
Assistant Secretary of the Interior.

Countersigned:

A. P. GREELEY,
Acting Commissioner of Patents.