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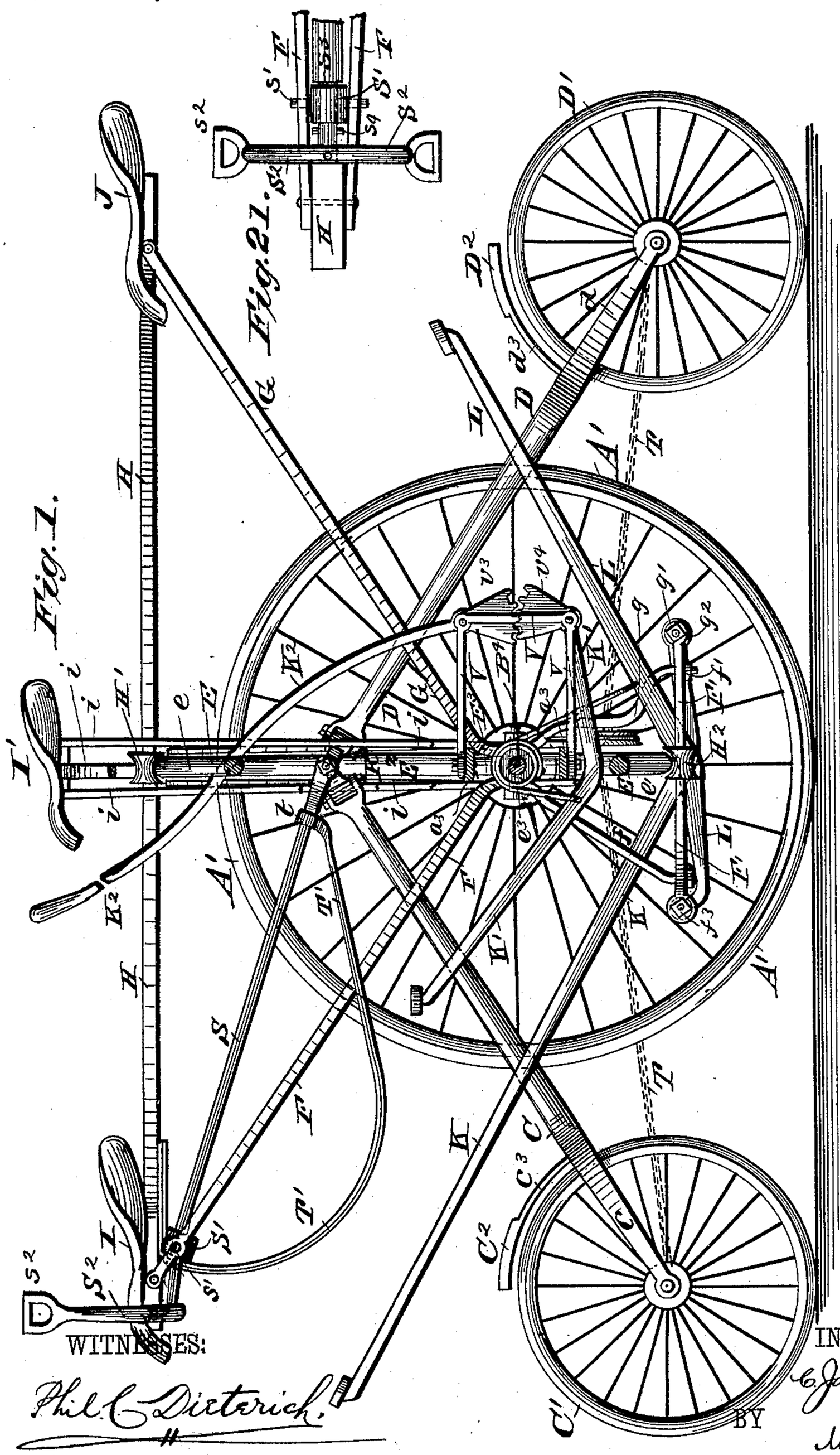
C. JACKSON.

VELOCIPEDE.

No. 395,441. Patented Jan. 1, 1889.



WITNESSES:

Phil. C. Dieterich.

C. Sedgwick

INVENTOR:

C. Jackson

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Munn & Co.

ATTORNEYS.

(No Model.) 5 Sheets—Sheet 2.

C. JACKSON.

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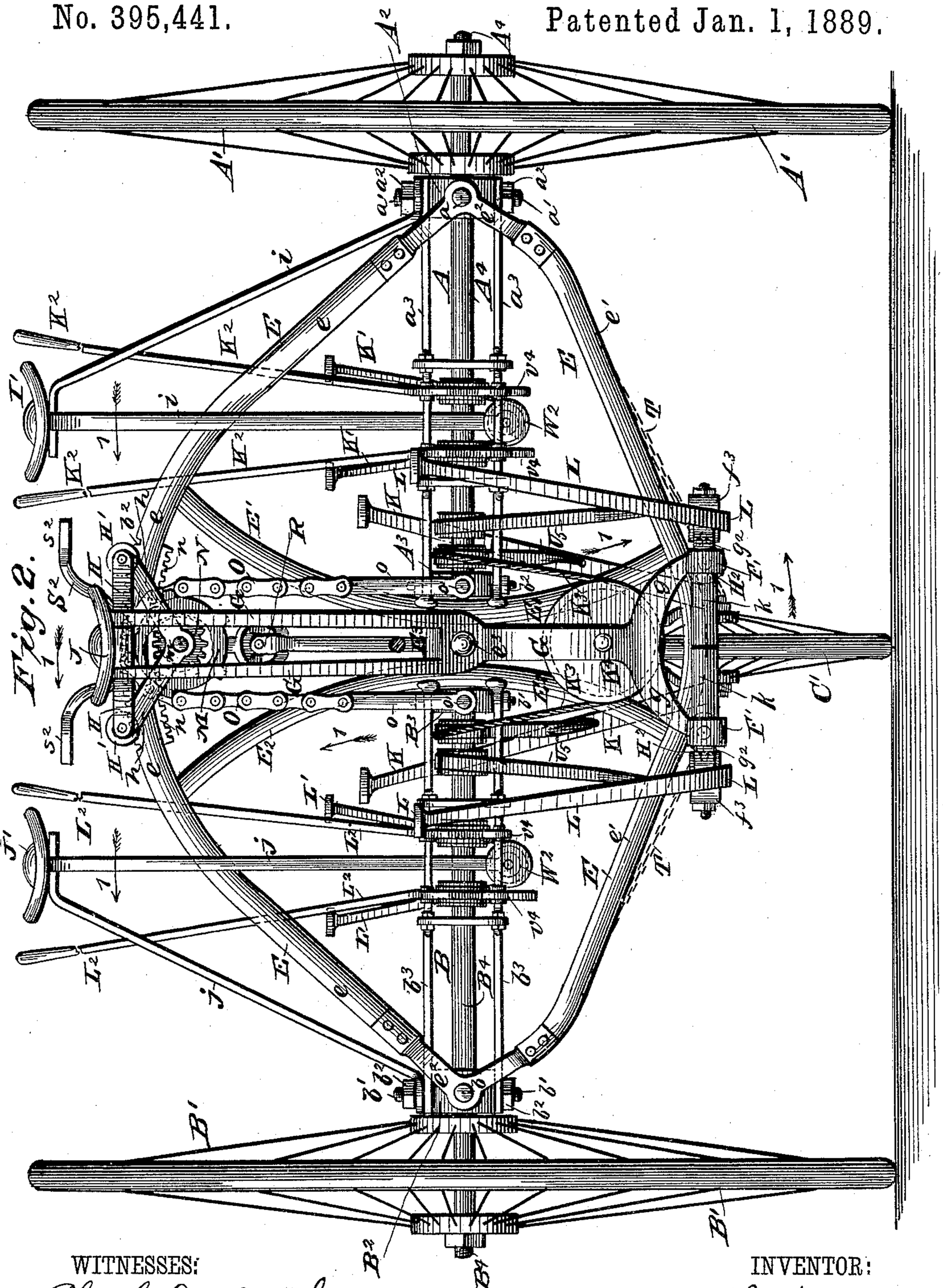

Fig. 2.

WITNESSES:
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(No Model.)

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C. JACKSON.

VELOCIPEDE.

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Fig. 5.

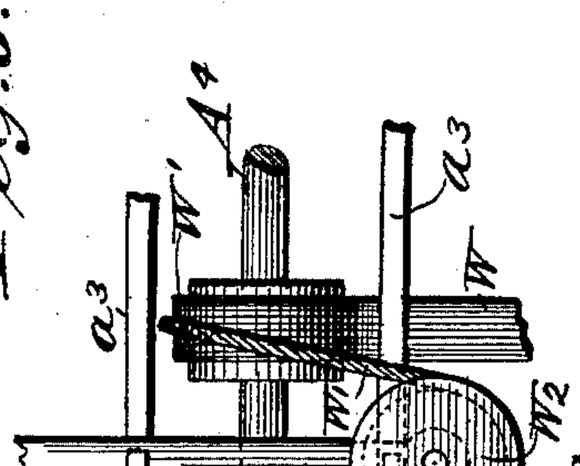

Fig. 6.

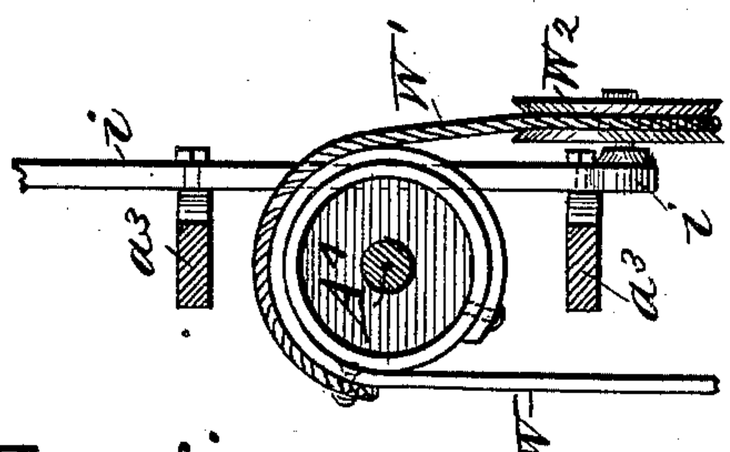

Fig. 3.

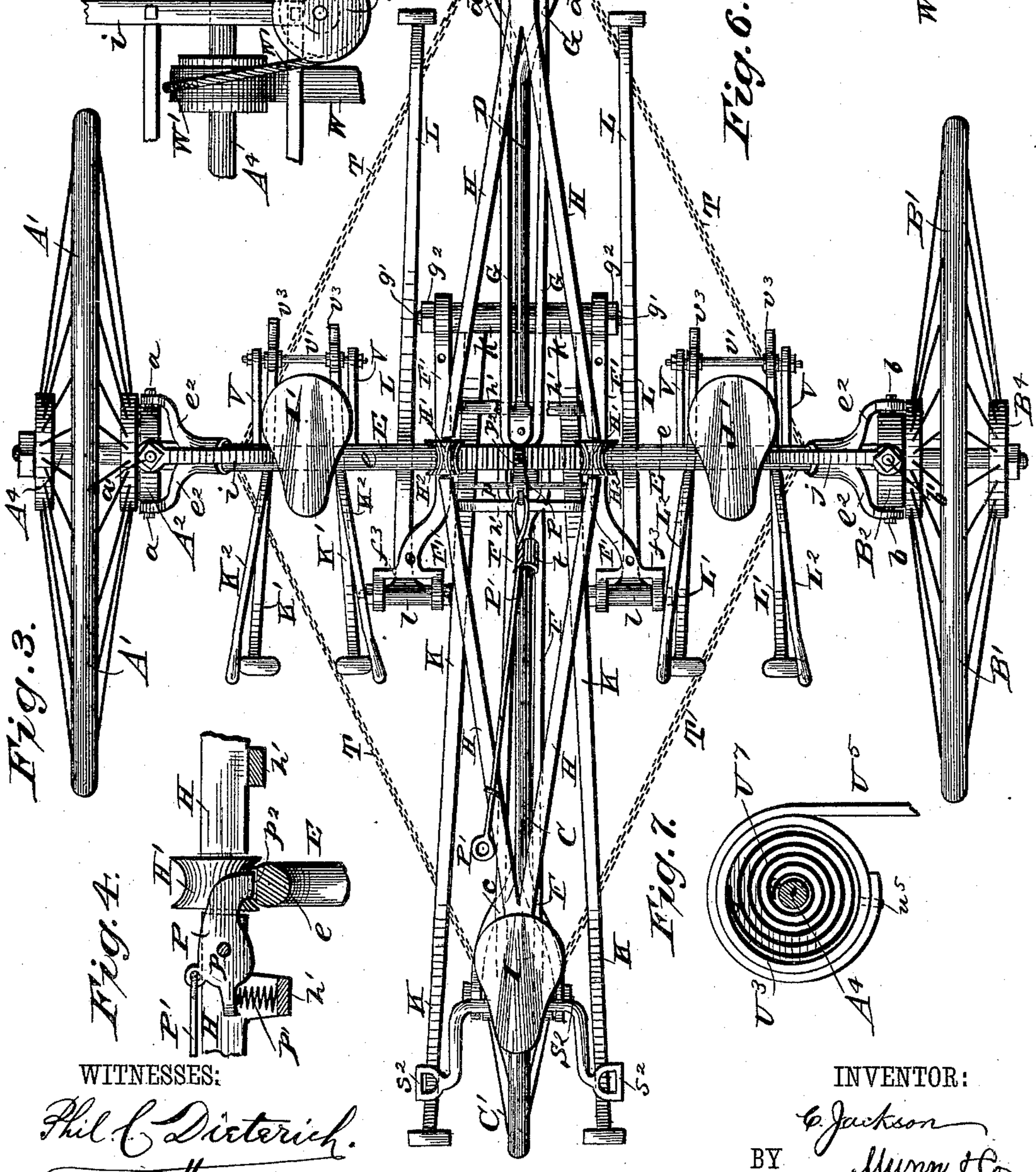

Fig. 4.

Fig. 7.

WITNESSES:

Phil. C. Dieterich.

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(No Model.)

5 Sheets—Sheet 4.

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VELOCIPEDE.

No. 395,441. Patented Jan. 1, 1889.

Fig. 8.

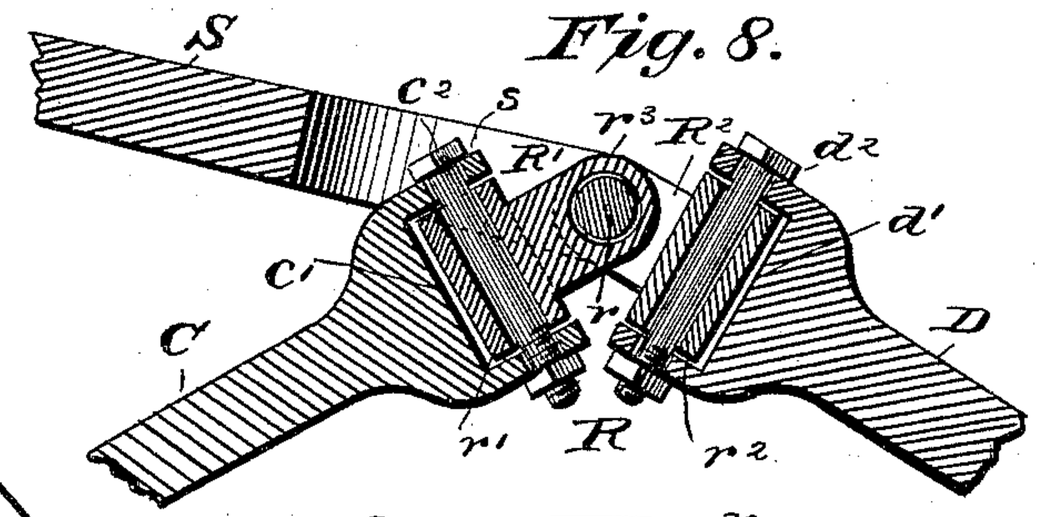


Fig. 9.

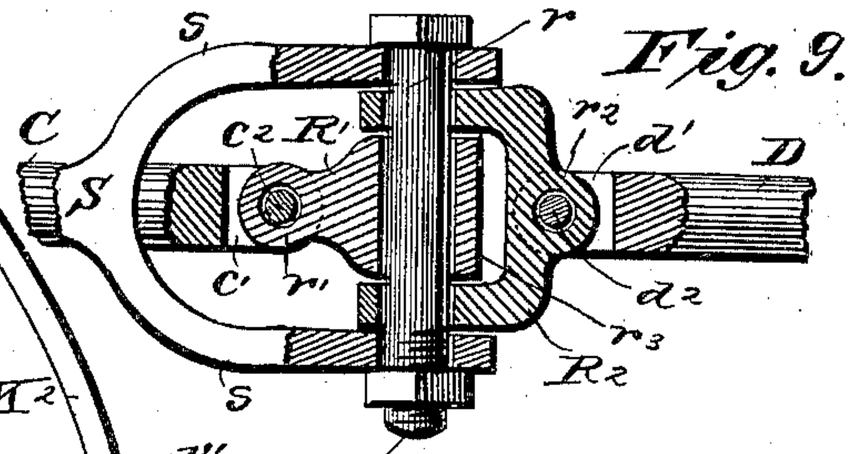


Fig. 11.

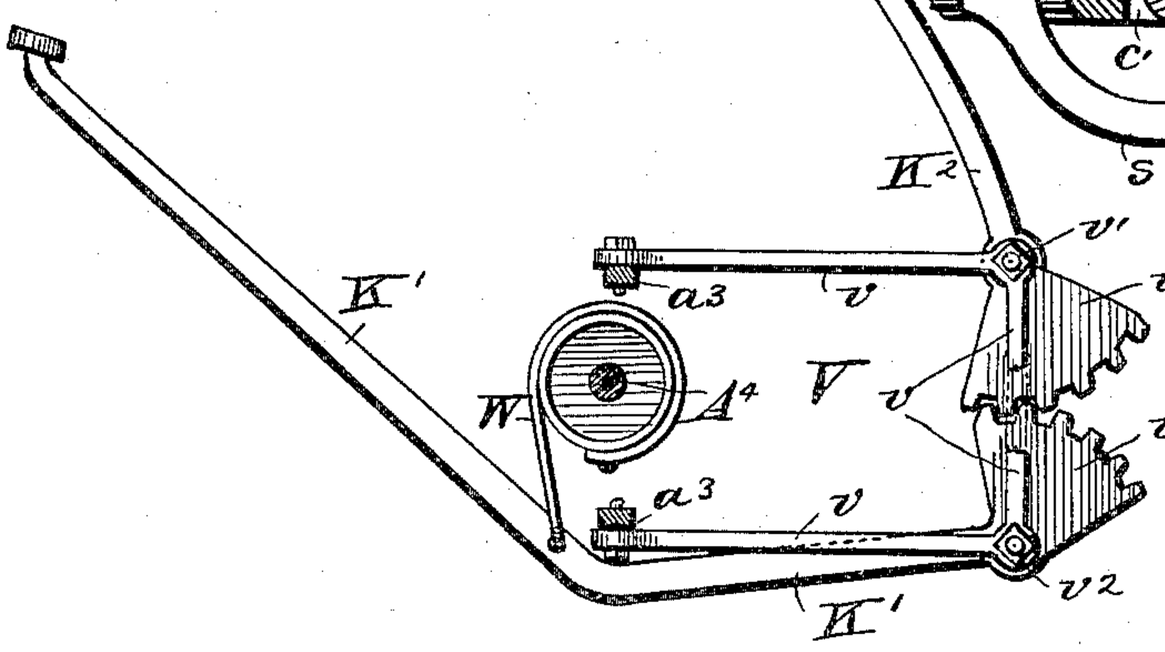


Fig. 10.

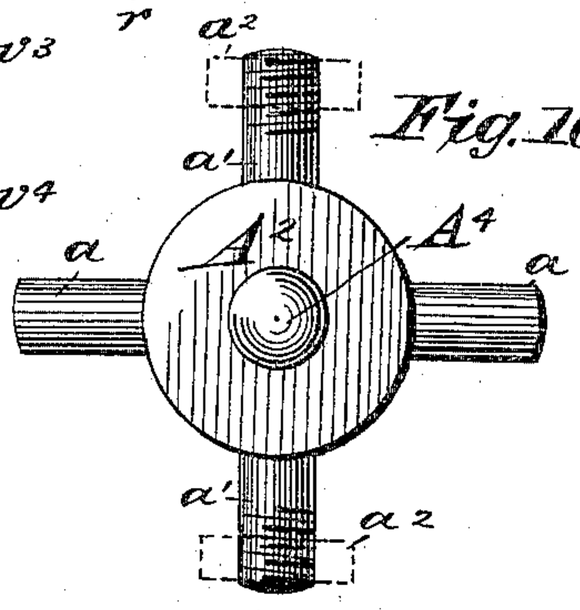


Fig. 13.

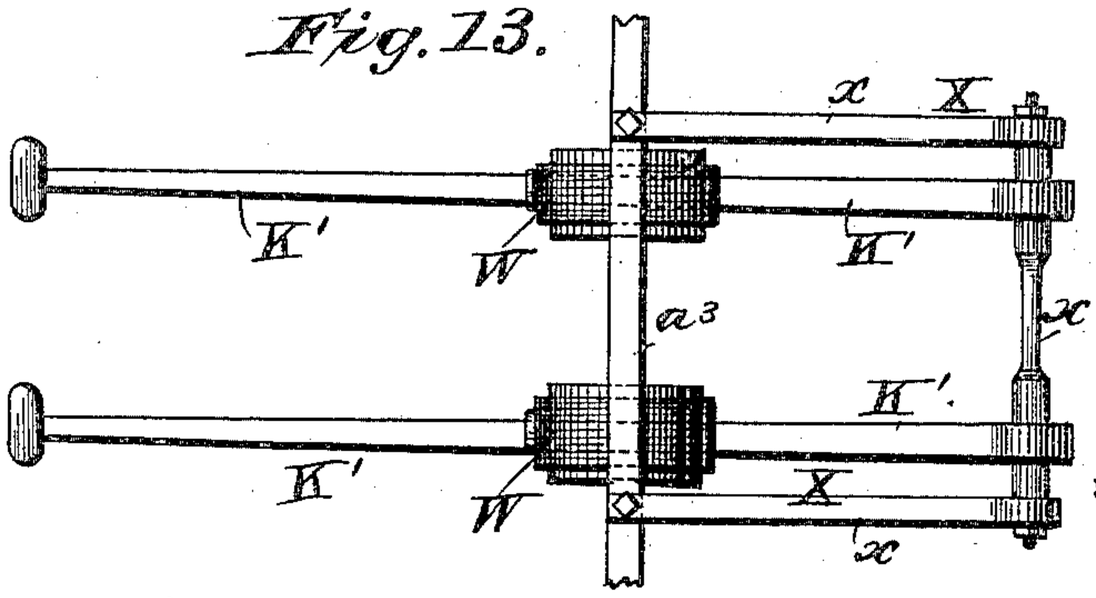


Fig. 12.

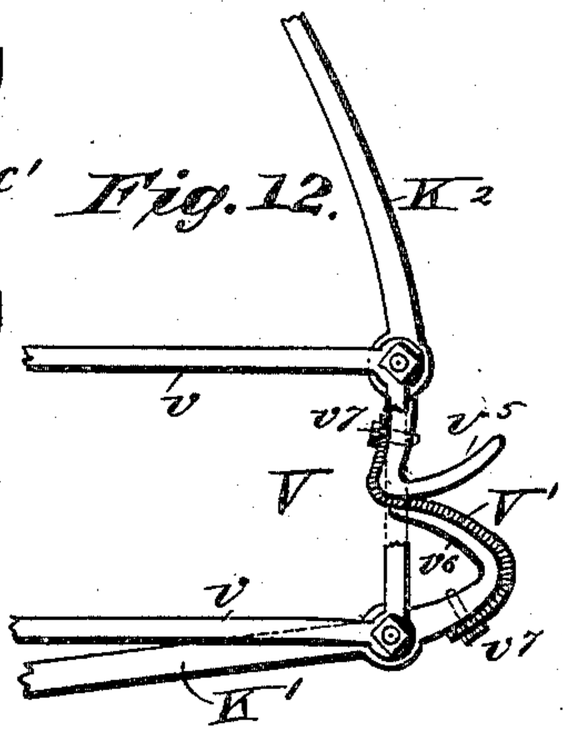
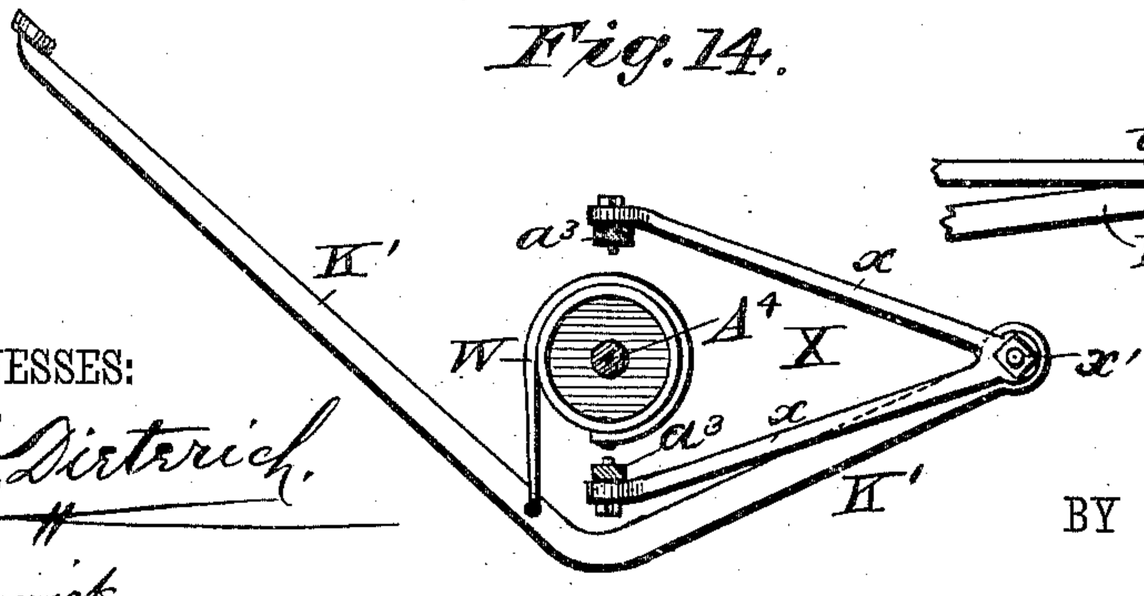


Fig. 14.



WITNESSES:

Phil. C. Dietrich.

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INVENTOR:

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(No Model.) 5 Sheets—Sheet 5.

C. JACKSON.

VELOCIPEDE.

No. 395,441. Patented Jan. 1, 1889.

Fig. 15.

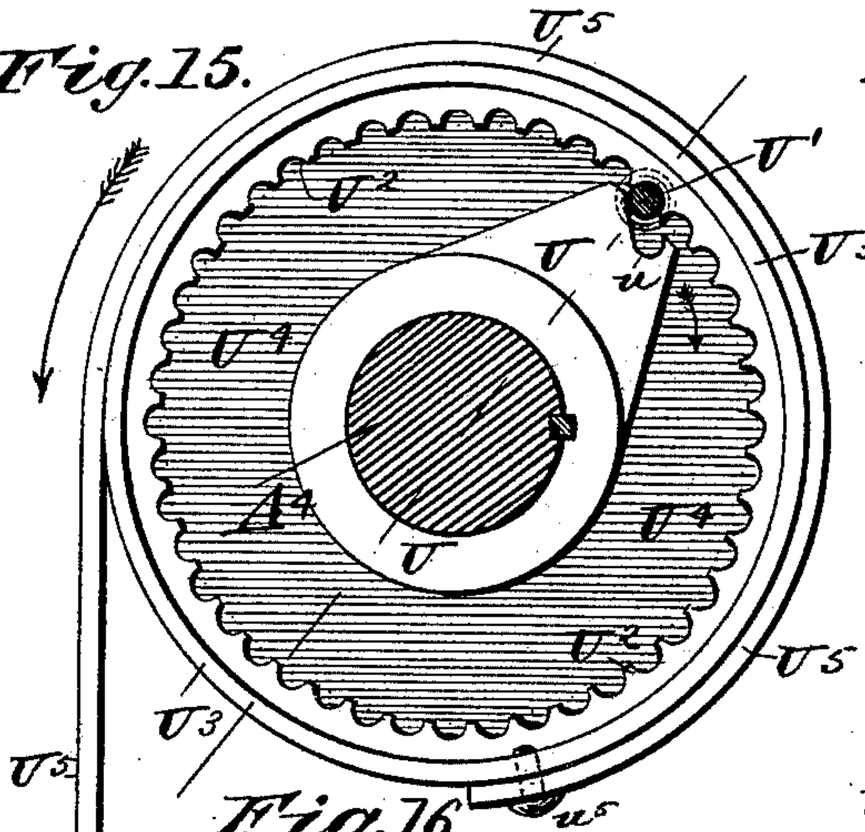


Fig. 17.

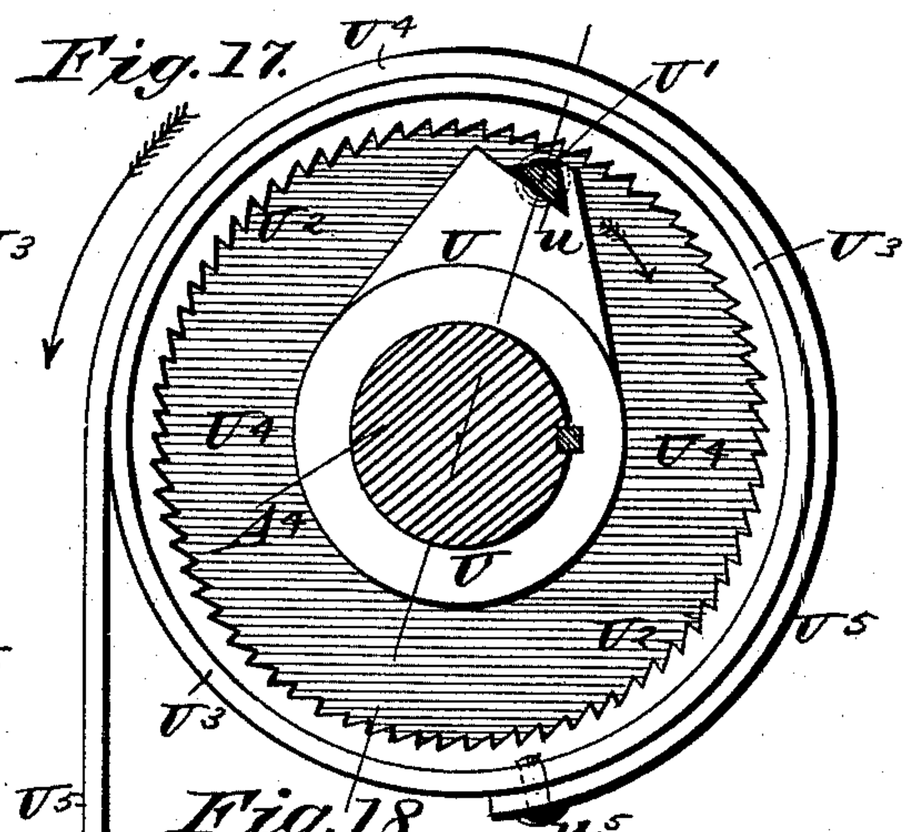


Fig. 16.

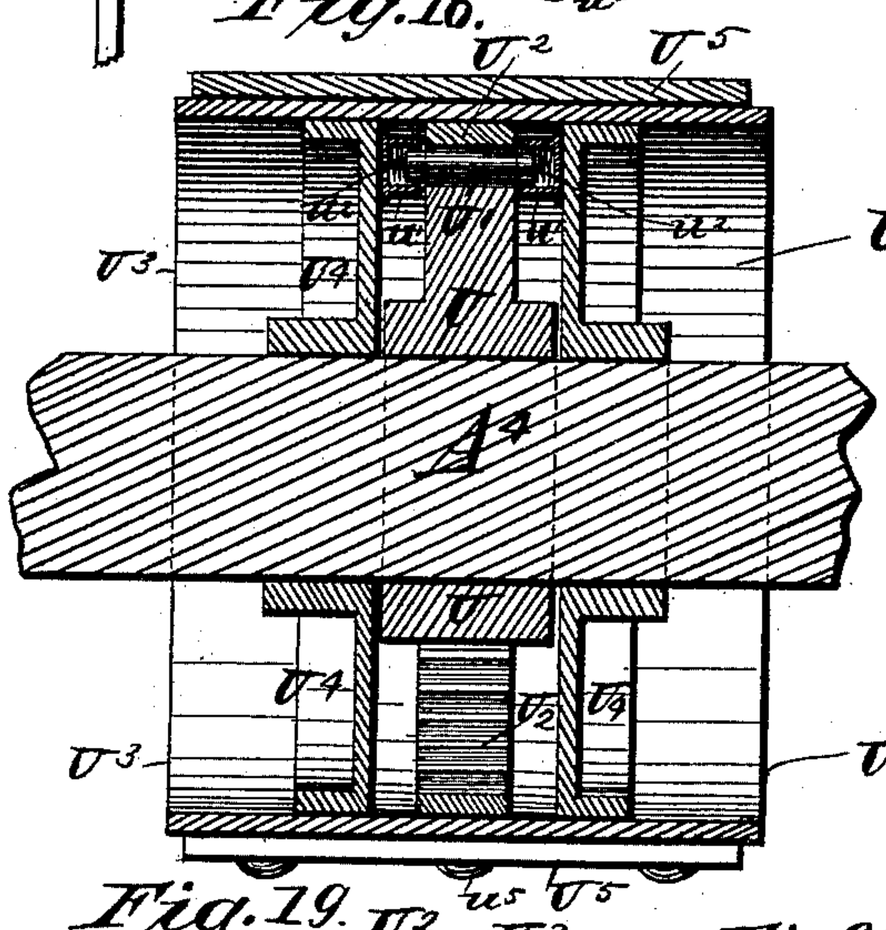


Fig. 18.

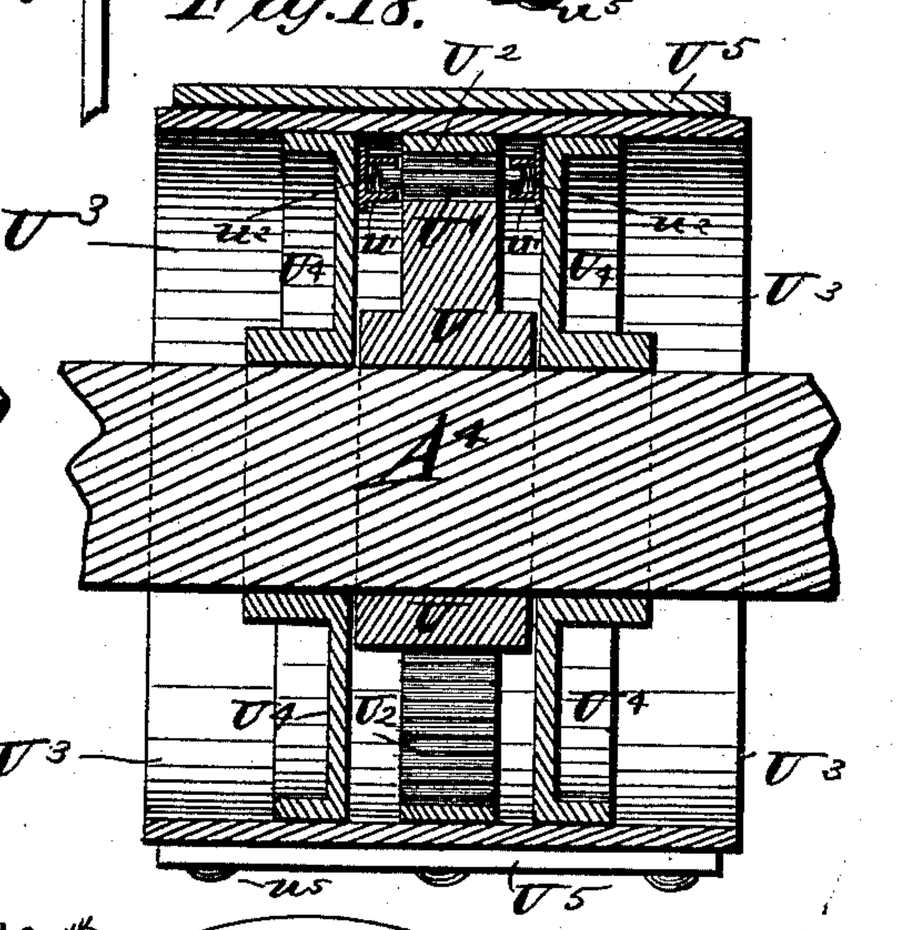


Fig. 19.

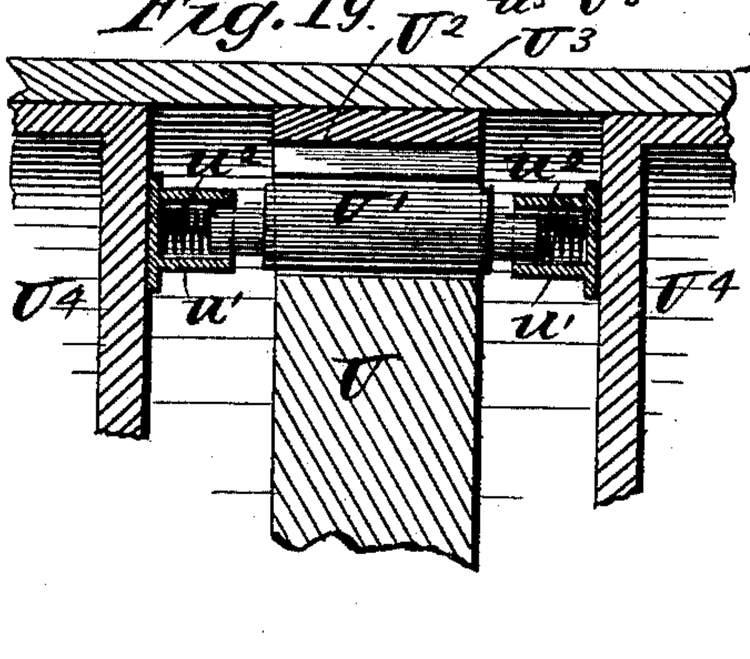
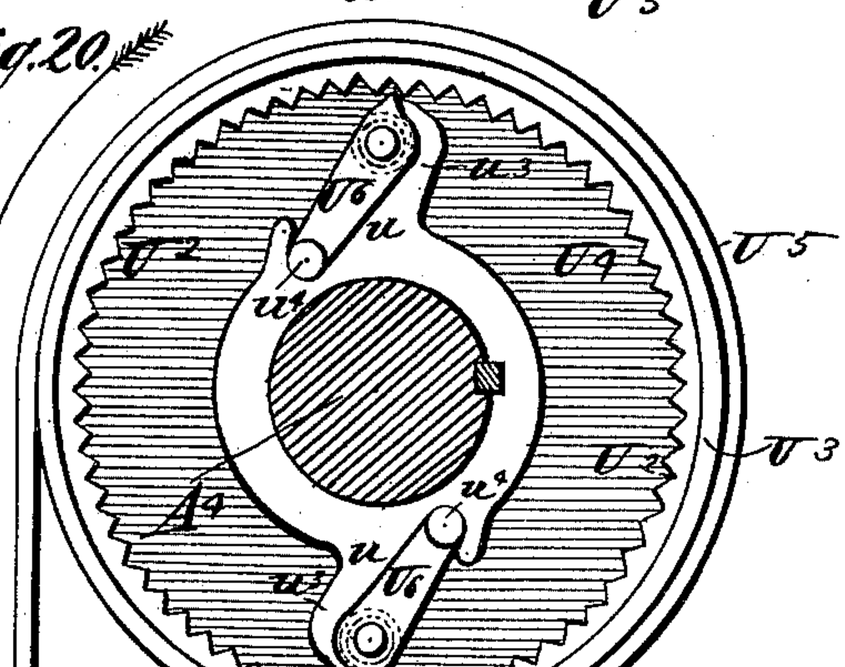


Fig. 20.



WITNESSES:

Phil. C. Dieterich.

C. Sedgwick.

INVENTOR:

C. Jackson

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

CALVIN JACKSON, OF JACKSONWALD, PENNSYLVANIA.

VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 395,441, dated January 1, 1889.

Application filed January 10, 1888. Serial No. 260,318. (No model.)

To all whom it may concern:

Be it known that I, CALVIN JACKSON, of Jacksonwald, in the county of Berks and State of Pennsylvania, have invented a new and Improved Velocipede, of which the following is a full, clear, and exact description.

My invention relates to velocipedes, and has for its object to provide an efficient, light, and durable machine of this character adapted more especially for four riders—one in front and one behind over the steering-wheels, and one rider at each side near the main driving-wheels.

The vehicle embodies important novel features of construction, allowing leveling of the axles and consequent plumbing of the main driving-wheel tires on transversely sloping or uneven roads to prevent racking strains on the running-gear, and also embodies an arrangement of a main central seat-frame, allowing it to be shifted laterally to level the seats transversely for promoting the steadiness and comfort of the riders on said seats.

The invention also embodies various minor improvements auxiliary to the above-named important features of construction, and also a novel arrangement of the main frame and novel constructions of the treadle and hand-lever and driving-clutch mechanism, all as hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of my improved velocipede with parts broken away and in section. Fig. 2 is a rear view of the machine with parts broken away. Fig. 3 is a plan view of the machine with parts removed; and Figs. 4 to 21, inclusive, are detail views of various parts of the mechanism of the velocipede, which will be hereinafter particularly referred to in the general description of the machine.

The velocipede is made with four wheels—two opposite side wheels, A′ B′, of considerable size, which are mounted for rotation at the outer ends of axles A B, respectively, of peculiar construction, and capable of vertical movement at their inner ends, as hereinafter explained, and two wheels, C′ D′, arranged, respectively, at the front and rear of the machine to travel in a path about midway between the paths of the main side or driving wheels and journaled at the outer forked ends of bars C D, respectively, which are connected at their inner ends to a universal joint of peculiar construction, and to which joint is connected the steering-rod leading to the front center seat for operation by the rider thereon, all as hereinafter more fully described.

The main frame of the velocipede is very light and strong, and is made with a central metal frame portion, E, which ranges transversely of the machine and comprises an upper bowed or convex bar or part, e, and a lower downwardly-concaved bar or part, e', and forked extremities e^2 e^2, which latter are preferably each made of one piece of metal formed with two forks ranging about at right angles to each other and adapted for connection by bolts or otherwise with the opposite ends of the frame-bars e e'. The forked extremities e^2 of the frame E are bored at their angles to receive pins a a b b, which are fixed in metal blocks A^2 B^2, secured by bolt ends a' a' b' b' and nuts a^2 a^2 b^2 b^2 to upper and lower metal axle-straps, a^3 a^3 b^3 b^3, which at their inner ends are connected by like bolt ends a' b' and nuts a^2 b^2 to metal blocks A^3 B^3, which are located at the inner ends of the axles A B, and are adapted for movement along the outer faces of curved metal bars E' E^2, which are bent in arcs of circles struck from the pins a b, respectively, as centers, and are fixed at opposite ends to the upper and lower bars or parts, e e', of the frame E. At or a little below their center parts the frame-bars E' E^2 are fixed to a metal block, E^3, which is interposed between them, and which is provided with a longitudinally-ranging heavy pin or bolt, e^3, onto which is hung or pivoted the bent front and rear forked bars, F G, which support the upper fore-and-aft seat-frame, H, and its front and rear central seats, I J, and also the lower shafts or carriage of the foot-levers operated by riders on the seats I J, as hereinafter more fully explained.

I will here state that the main side or driving wheels, A′ B′, of the velocipede are fixed to the outer ends or arms of shafts A^4 B^4, re-

spectively, which are journaled in the axle-blocks A^2 A^3 B^2 B^3, which are connected in pairs by the metal straps a^3 b^3, as above stated.

The inner ends of the axle-straps a^3 b^3, or it may be the outer faces of the axle-blocks A^3 B^3, are fitted to the outer faces of the frame-bars E′ E^2 to prevent forward and backward play thereat of the axles, while allowing their inner ends to move up and down freely on these frame-bars or around the outer faces of the bars as the inner ends of the axles are raised or lowered by pressure on the treadle-levers operated by the front and rear riders on the seats I J, the entire axles A or B then swinging on the pins *a b* in the outer axle-blocks, and in a manner and for purposes hereinafter explained.

The construction of all four of the axle-blocks is alike, and will be clearly understood from the face view of one of the blocks shown in enlarged scale in Fig. 10 of the drawings.

The parts of the frame-bars F G which extend upward and outward from the block E^3, to which they are pivoted, are forked or bifurcated to allow the passage within their forks without touching them of the front and rear steering-wheel bars, C D, and the lower ends or parts of the bars F G are more widely forked at *f g*, respectively, and the extremities of these forks are passed through two opposite side bars, F′ F′, and receive nuts *f′ f′* below these side bars. The rear ends of the lower horizontal frame-bars, F′ F′, are connected by a bolt or bar, *g′*, held, preferably, by nuts g^2 at the outer faces of the bars. These bars F′ F′, their cross-bar *g′*, and the lower forked extremities, *f g*, of the main fore-and-aft frame-bars F G thus constitute a lower carriage or frame, on which are fulcrumed the two pairs of levers K K and L L, operated by the riders on the seats I J, respectively. The lower forked ends, *f g*, of the frame-bars F G are not shown in Fig. 3 of the drawings, as they would interfere with a clear representation of other parts of the machine; but the holes in the bars F′, which receive the bolt ends at the extremities of the forks *f g*, are shown in said view. The foot-levers K K are fulcrumed at their rear ends, *k k*, upon the cross-bar *g′*, and extend thence about horizontally to a point below the transverse frame-bar E, and thence these levers range upward and forward, and at their forward ends are provided with foot-plates in easy reach of the rider on the front central seat, I, on the frame H. The forward ends of the levers L L are passed into the forward forked ends, f^3 f^3, of the lower frame-bars, F′ F′, and are fulcrumed on pins held to said ends f^3, and these levers extend rearward beneath the frame-bar E, and thence rearward and upward, and are provided with foot-plates in convenient reach of a rider on the rear seat, J, on the frame H.

It is obvious from the aforesaid description that the bars F G F′ F′ *g′*, the upper frame, H, carrying the seats I J, and the two pairs of treadle-levers K K L L are connected in a manner to cause them all as one structure to swing laterally of the machine and upon the bolt or pivot-pin e^3 in the transverse frame E as a center of motion. The upper and lower edges or faces of the frame E at its center are curved upon arcs of circles struck from the fulcrum or pivot e^3 as a center; hence the seat-frame H and the lower lever-carriage may be guided and stayed by movement on the frame E, and this is accomplished in the preferred manner by fitting rollers H′ H^2 onto axle-pins held to the seat-frame and lever-carriage, respectively, said rollers running on the opposite upper and lower parts, *e e′*, of the frame E and fitting this frame in a manner to prevent forward and backward movements of the entire seat and lever-carriage structure. This lateral motion of the seat-carriage H gives a lateral balance to the machine and always causes the front and rear seats, I J, on said frame to maintain a true level to enable the riders to firmly keep their places when the machine is running on sloping side-hill roads and when the axles A B are adjusted to cause the wheels connected to them to run with practically plumb tires, and as hereinafter more fully explained. This feature of giving a lateral motion to the seat-frame H on the transversely-ranging portion E of the machine-frame is important independently of any connection of the seat-frame with the axles A B of the machine; but as a further and important improvement I have connected the seat-frame with the axles in a manner to cause this frame and its seats to be shifted automatically as the axles are vertically adjusted at their inner ends, and as next described.

To the under side of the seat-frame H, at its center, and at opposite faces of the frame E, are fixed a pair of brackets, *h*, at the angles of which is journaled a shaft, *m*, on which is fixed a couple of chain-wheels, M, between which, on the shaft, is also fixed a toothed wheel or pinion, N, which meshes with a rack, *n*, fixed to the under side of the top bar, *e*, of the frame E. On the chain-wheels M are placed a couple of chains or link belts, O, which hang down—one at each side of the frame-bars E′ E^2—and are connected at their opposite ends by links *o* with pins *o′* on the front and rear faces or sides of the inner blocks, A^3 B^3, of the axles A B. These pins *o′* are counterparts of the pins *a b* on the front and rear sides of the outer end blocks, A^2 B^2, of the axles. It is obvious that as one of the axles A B is lowered at its inner end and draws on the chain O the other of the axles will be raised at its inner end, and at the same time the seat-frame H and its seats I J will be shifted laterally in a direction away from the outer end of the lowered axle and toward the outer end of the raised axle, the lower lever-carriage structure being simultaneously shifted laterally in a direction opposite to the lateral movement of the seat-carriage. This raising and lowering of

the inner ends of the axles is accomplished by pressure of both the riders on the seats I J upon their treadles at the side next the axle to be lowered, and as hereinafter more fully explained.

Provision is made for locking the seat-frame H, and consequently the lower lever-carriage also, at any desired lateral adjustment by means of a pawl or dog, P, which is pivoted on a pin, p, set in the frame H, and is normally pressed by a spring, p', interposed between it and one of the cross bars or braces h' h' of said frame. The spring presses the pawl into any one of a series of notches of a rack, p^2, made in the top of the transverse frame E. A rod or cord, P', connected to the pawl P, extends forward within reach of the rider on the front seat, I, who by pulling the rod will disengage the pawl from the frame E when the axles are to be adjusted by pressure on the treadles. The arrangement of this locking-pawl and its operating-rod is shown clearly in Figs. 3 and 4 of the drawings.

I will next particularly describe the front and rear steering-wheels, C' D', and their connections with the machine-frame and the steering-rod device and seat-spring, as follows: These wheels are journaled on axles fitted in the forked ends c d of bars C D, connected to a universal joint, R, of peculiar construction, and shown most clearly in Figs. 8 and 9 of the drawings. The adjacent upper inner ends of the bars C D are forked at c' d', respectively, and within these forks and on pins c^2 d^2, ranging transversely of the bars C D, are pivoted the outer parts or bosses, r' r^2, of two joint-pieces, R' R², said piece R² being forked to receive the boss or outer part, r^3, of the piece R', and a pin, r, which normally ranges transversely of the machine, passes through the forked outer part of the piece R² and the part r^3 of the piece R' to connect these two joint-pieces. When the wheels C' D' are running straight ahead, the forked ends c' d' of the bars C D stand in vertical plane, and the pivots c^2 d^2 then range directly downward and inward toward each other at about right angles, and the transverse pin r is about level. To this pin r is also connected the rear forked end, s, of a bar or rod, S, which extends forward below the front seat, I, and is passed through a collar or bearing, S', held by a pin, s', between the sides of the forked upper end of the frame-bar F, and to the outer end of the rod S is fixed a transversely-ranging steering-bar, S², having handles s^2, which may be grasped by the rider on the seat I to enable him to turn the rod S axially in the bearing or collar S', and thereby flex the universal joint R either way to cause the wheel-bars C D to be turned axially for simultaneously turning the front and rear wheels, C' D', to guide the velocipede to either side. When the right-hand handle s^2 of the steering-bar S² is depressed, the transverse pin r of the universal joint R will be inclined downward toward the right hand, and the wheel-bars C D will be turned axially and swung toward the right hand at their outer ends to turn the wheels C' D' bodily or to incline their faces at greater or less angle with each other for turning the machine toward the right hand in any desired longer or shorter curve, and when the machine is to be guided to the left hand the left-hand steering-bar handle s^2 will be depressed to cause the wheels C' D' to swing over toward each other at the left-hand side of the vehicle for turning the machine to the left in a longer or shorter curve, which will depend on the extent to which the handle s^2 is depressed. The bar S turns axially in the collar S', held between a shoulder, s^3, on the bar and a pin, s^4, in the bar, as will most clearly be seen in Fig. 21 of the drawings.

The extremities of the steering-wheel bars C D are connected or stayed to opposite end portions of the transverse frame E by four chains, T, which remain taut when the machine is moving straight ahead or is steered to either side, and will flex at one side or the other only when the wheels C' D' are turned while the machine is at a standstill.

A spring, T', is fixed at its forward end to the under side and front part of the center seat-frame, H, and thence is bent downward and rearward and is connected to a collar, t, which is fitted loosely upon the steering-bar S, thus allowing said bar to turn axially in the spring-collar t while the rider is steering the vehicle. This spring T' has excellent effect in balancing the machine and in taking up the jars incident to the travel of the wheels C' D' over inequalities of the road, and almost wholly prevents these jars being communicated to the frame H and the seats I J, thus promoting the comfort of the riders on these seats.

A couple of brake-shoes or plates, C² D², are fixed to elastic arms c^3 d^3, held, respectively, to the bars C D. These plates C² D² normally stand above the steering-wheels C' D', and are in convenient reach of the feet of the riders on the seats I J, respectively, who may at any time press the brakes to the wheels to slow up or stop the vehicle.

I show the velocipede provided with two opposite side seats, I' J', supported by metal standards or plates i j, respectively, from the frame-plates a^3 b^3 of the axles A B, respectively, and immediately over the transverse frame E of the vehicle. These side seats are more especially intended for ladies use, who may ride as passengers only, while the machine will be propelled by gearing operated from the treadles K L, driven by the riders on the front and rear seats, I J; but I have provided pairs of treadle-levers K' L', to be operated by persons on the side seats, I' J', who will also operate pairs of hand-levers K² L², to assist in propelling the vehicle, in a manner presently explained. It will be noticed that as the side seats, I' J', are supported fixedly from the axles A B, said seats will be

raised or lowered with the axles; but they will always maintain nearly the same positions relatively to the center, front, and rear seats, I and J. In other words, the seats I′ J′ will move either to the right or left hand, as the seats I J move in the same direction on the frame E; but one of the side seats will be slightly raised while the other side seat is lowered a little.

I will next describe the mechanism operated by the treadle and hand levers for propelling the vehicle. This mechanism consists of clutch-pulleys held to the axles A B and connected to the levers by straps. There are four sets of these clutch-pulleys, or eight in all, and each pulley is connected to one of the levers. As the clutch-pulleys all embody the same principles of construction, I will particularly describe one of them, with simple modifications, and as shown most clearly in Figs. 15 to 20 of the drawings, reference being first more especially made to Figs. 15 to 18, inclusive.

To the wheel-shaft A^4 is fixed by a key or otherwise an arm, U, which is provided at its outer end with a notch, *u*, adapted to receive a pawl or pin, U′, which ranges transversely to the arm or parallel with the clutch shaft or support, and is adapted to enter or lock with a circular rack, U^2, which is fixed to the inner face of a ring, U^3, which is fixed to the peripheries of two disk-plates, U^4 U^4, which are fitted for free rotation on the shaft A^4, one at each face or side of the arm U, which is fixed to the shaft and rotates it when a strap, U^5, fixed at one end at u^5 to the pulley ring or rim U^3 and at the other end to one of the treadle or hand levers, is drawn upon by depressing the lever.

The clutch-pawl may be round in cross-section to fit a rounded recess, *u*, in the end of the arm U and rounded notches in the rack U^2, as shown in Figs. 15 and 16; or the pawl may be angular in cross-section to fit an angular recess, *u*, in the end of the arm U and angular notches in the rack U^2, as shown in Figs. 17 and 18 of the drawings.

The ends of the clutch-pawl U′ project from each side of the arm U, which carries it, and onto these projecting ends of the pawl are fitted a couple of caps, u' u', which are adapted for frictional contact with the inner faces of the opposite disk-plates U^4 of the device. Springs u^2, or any suitable elastic substance interposed between the caps and the ends of the clutch-pawl, normally force the caps outward against the disk-plates. With this construction it is obvious that as the clutch-strap U^5 is pulled downward by the foot-lever the rim U^3 and the disk-plates U^4 of the clutch will be rotated on the shaft A^4 in the direction of the arrows in Figs. 15 and 17 of the drawings, and the friction of the disk-plates on the pawl-caps u' will carry the pawl forward from the base of its notch *u* and into engagement with the clutch-rack U^2, which will cause the pawl to engage the arm U and rotate the wheel-shaft A^4, and on the return or reverse motion of the clutch-rim and disk-plates the plates will, by their friction on the pawl-caps, carry the pawl around and farther into the notch *u*, and thereby disengage it from the clutch-rack U^2 and allow the backward rotation of the clutch to wind the strap A^5 onto it again and without effect on the wheel-shaft. This principle of operation of the clutch-pawl by the friction on its end or end caps of the disk-plate U^4 is availed of in the modified form of clutch shown in Figs. 19 and 20 of the drawings. The pawls U^6 U^6 of this clutch are fitted in larger notches or recesses, *u*, formed partly in or against diametrically-opposite radial extensions, u^3, of the clutch-arm U, keyed to the wheel-shaft A^4, and each of the pawls is fitted at its inner end against a steel thrust-receiving pin, u^4, held at the base of the arm-recess *u*. The free or outer end of each pawl U^6 is provided with laterally-extending pins, on which are fitted caps u', provided with springs u^2, forcing the caps outward against the faces of the two disk-plates U^4. The disk-plates, the rim, and the rack are arranged in this clutch like similar parts of the other clutches, and the operation of the pawls U^6 by the friction of the disk-plates U^4 is in all respects similar to that above described for the pawls U′. There may be but one, or two or more, of the operating-pawls in each clutch.

The clutch-pawl or detent may be operated without the friction devices on its ends to bear against the opposite parallel plates U^4 U^4, provided these plates be fitted sufficiently close to the ends of the pawl and a little oil be used thereat; but the use of some spring-pressed friction device at the ends of the pawl is preferred in practice to accommodate possible irregularities or lack of parallelism of the two disk-plates which actuate the pawl. I make special mention of the broad substantial bearings of the clutch-rim directly on the driving-shaft, which secures a very durable construction not attained in other clutches of this character, together with the operation of the pawl by the two disk-plates working one at each end of the pawl as they shift the pawl promptly and positively and squarely outward or inward for its entire length without requiring guides for the pawl other than the one face upon which it rests in the arm notch or recess, and friction-rings, cog-wheels, and costly guides are dispensed with; and the one very light and inexpensive pawl fitted to an easily-formed seat meets every requirement and reduces the friction to a minimum, thus promoting the effective operation and durability of the entire clutch, which may be manufactured at a greatly-reduced cost as compared with other devices of this general character.

The straps U^5 of the two inner clutches are attached at their lower ends to the two front treadle-levers, K K, and to these straps are connected the opposite ends of a rope or cord,

K^3, which at its center portion runs beneath a grooved pulley, K^4, journaled on the frame-bar G, and whereby as one of the two treadle-levers K is lowered by the rider on the seat I the other of the two levers will be raised into position for the next depression to continue the rotation of the wheel-shafts A^4 B^4, one of the two clutches being fitted on each of the shafts next the inner blocks, A^3 B^3, of the axles A B, respectively, all as will be understood most clearly from Fig. 2 of the drawings.

It will be noticed that the arrangement of the clutches, their cord K^3, and the pulley K^4, with the treadle-levers K K, materially assists in steadying the inner ends of the axles, however they may be adjusted to plumb their wheels on laterally-sloping or uneven roads, and the pulley K^4 and cord K^3, with the clutches, are especially valuable (independently of their function of reversing the clutch pulleys and levers) for steadying the inner ends of the axles while "coasting," at which time both levers K K will be held about level by the front rider.

The straps U^5 of the two clutches on the wheel-shafts A^4 B^4, next to and outside of the clutches connected to the levers K, are connected to the levers L L, operated by the rider on the rear seat, J. I propose to cause the reverse or upward movement of these levers L by a coiled spring, U^7, fitted at the outside face of one of the clutch disk-plates and connected at opposite ends to the wheel-shaft and the rim of the clutch, and as shown in Fig. 7 of the drawings; but these two clutches or their straps may be fitted with a reverse cord or rope running beneath a large grooved pulley journaled on the same shaft with the pulley K^4, as will readily be understood.

I particularly describe the arrangement of the treadle-levers K′ L′ and the hand-levers K^2 L^2, operated by the riders on the side seats, I′ J′, as follows, and with more special reference to Figs. 1, 2, 3, 5, 6, and 11 of the drawings: To the upper and lower bars, a^3 b^3, of the axles A B are held two light strong metal frames, V, one to each axle, and each consisting of a pair of three-sided bars, v v, fixed at their forward extremities to the upper and lower bars, a^3 b^3, of the axles, and connected at their rear upper and lower angles by shafts v' v^2, which are preferably held by nuts and form the fulcrums of the foot-levers K′ L′ and hand-levers K^2 L^2. The right and left hand pairs of levers, K′ K^2 and L′ L^2, are provided with intermeshing toothed sectors v^3 v^4, respectively; hence while each of the treadle-levers K′ L′ is lowered by the foot of the rider the intergeared hand-lever K^2 or L^2 may be forcibly raised by the grasp of the rider's hand, who draws the lever toward him, and both foot and hand power may thus be advantageously exerted for powerful propelling effect on the vehicle. The pairs of clutches operated by these pairs of hand and foot levers are preferably connected to the levers by straps W W, to which or to the clutches they turn are also fixed the opposite ends of a cord or rope, W′, which runs beneath a guide-pulley, W^2, journaled to the lower end of the seat-support i or j or to the frame-bar a^3 or b^3, (see Figs. 2, 5, and 6 of the drawings,) and whereby as one of each pair of the foot and hand levers are moving on their effective strokes the other of each pair of the levers at each side of the vehicle will be given reverse movements, ready for their next effective strokes, and in substantially the same manner as the main foot-levers K K are reversed by the cord K^3, as above described.

Instead of using the toothed sectors v^3 v^4, I may provide the hand and foot levers with bent end parts v^5 v^6 and connect the opposite ends of a strap, V′, at v^7, to the levers near their fulcrums, as shown in Fig. 12 of the drawings, and whereby the hand and foot levers of each pair will be operated simultaneously, in a manner substantially as above described, when the levers are connected by the toothed sectors, one of these constructions being a substantial equivalent of the other.

When the hand-levers K^2 L^2 are not to be used, I will employ instead of the rectangular-formed three-sided frames V a frame, X, consisting of two angular or > - shaped side parts, x x, provided with or connected at their angles by a shaft or rod, x', onto which the foot or treadle levers are fulcrumed, the extremities of these parts x being fixed to the axle-frame bars a^3 or b^3, and as will be understood from Figs. 13 and 14 of the drawings. The clutches on the wheel-shafts A^4 B^4, and to which the levers K′ K^2 and L′ L^2 are connected, may be provided with springs to assure the return of each of the levers to position for the next effective stroke, substantially as above described for the clutches operated by the rear treadle-levers, L; but I prefer to use the reversing cords W′, with the levers operated by the persons on the side seats, I′ J′, substantially as shown and above described.

I would here state that the arrangement of the reverse-pulleys K^4 W^2 and their cords K^3 W′, respectively, with the clutch-straps and clutches operated by the riders on the front seat, I, and the two side seats, I′ J′, is important, in that it allows the foot-plates of the treadle-levers connected in pairs by these reverse pulleys and cords to be utilized as foot-rests, because when like pressure is brought upon the treadles operated by both feet of each rider on these three seats the levers will remain at rest, and the hand-levers K^2 L^2, also being at rest, will afford a firm hold for timid ladies riding on the side seats of the vehicle. There is no special need of the clutches operated by the rear foot-levers, L, being connected by a reverse pulley-and-cord device, as there is ample opportunity for the rider on the rear seat, J, to find foot-rests on the frame of the machine without utilizing the treadles of the levers L for the purpose.

In view of the aforesaid description of the

machine a brief general statement of its operation will suffice, as follows: When the machine is running straight ahead and on a road which is comparatively level transversely, the seat-frame H and seats I J will be about level and at the transverse center of the frame E, and the two axles A B will also be about level or in alignment, all as shown in Fig. 2 of the drawings. Should the machine run onto a road which slopes toward the right hand, or should the right-hand driving-wheel, A,′ run into a rut or gutter, this would throw the right-hand side of the machine down and incline the riders' seats I J that way, and also throw the wheel-tires out of plumb, thus making it uncomfortable for the riders and bringing damaging strains on the wheels and other parts of the vehicle. All these hurtful tendencies may be almost instantly corrected by the riders on the seats I J, both bearing down at once on the right-hand treadle-levers, K L, which will bring the axles A B into level positions independently of each other and set their wheels A′ B′ again on plumb-tires, and, through the medium of the chains O and the gearing M N *n*, the seat-frame H and its seats I J will be carried over on the transverse frame E toward the left hand and will again stand level transversely, the side seats, I′ J′, then also moving toward the left hand, while the lower lever-carriage portion of the machine moves on the frame E toward the right hand, the direction of movement of these several parts being indicated by the arrows 1 in Fig. 2 of the drawings. It will be understood that when these movements are to be given the machine the rod P′ will first be drawn upon by the rider on the front seat, I, to disengage the pawl P from the rack p^2 on the frame E, and when the adjustments are completed the pawl will again be permitted to engage the rack to lock the parts in their new positions. Usually the riders on the seats I J will operate the right-hand lever K and left-hand lever L and the left-hand lever K and right-hand lever L in pairs, simultaneously, to bring force or pressure onto both axles A B at once; hence when the axles are to be shifted and the seats moved laterally, as above described, the front rider will simply change step and then disengage the pawl P from the rack p^2, and then press simultaneously with the rear rider on the treadle connected to the axle to be depressed. When the left-hand axle, B, is lowered at the inner end, the machine will run easily on roads sloping toward the left hand, the laterally-movable parts then being shifted in directions the reverse of those indicated by the arrows.

The velocipede is easily steered by the front rider on the seat I operating the steering-bar S^2, as above described, and very short turns may be made, and when steering the vehicle the lateral motion of the seats, above described, may be availed of to throw the weight toward the center of the curve, and thereby overcome any tendency of the machine to upset when turned sharply to either side. The operation of the foot and hand levers by the riders on the two side seats, I′ J′, will be clearly understood from the aforesaid description, as also will be the operation of the clutches on the wheel-shafts of the axles.

I am not limited to the use of all four seats and the propelling-levers operated by the riders thereon in so far as some of the important principles of construction of my velocipede are concerned, as it is obvious that the side seats, I′ J′, and the levers K′ K^2 L′ L^2 operated by the riders on said seats may be dispensed with, and the machine then would be a tandem vehicle or would have the front and rear seats, I J, only; or either the front or rear seat, I or J, may be dispensed with, the two side seats then being retained to accommodate one man and two women, the steering-rod and connections and the seat-frame spring then being arranged at the rear seat should it be retained instead of the front seat. With slight modifications of the mechanism a single seat only may be used at the center of the frame to accommodate but one person; but I purpose making the machine with either two, three, or four seats, as above described.

It will be noticed that the arrangement of the four wheels is such that the peculiar steering mechanism comprising the universal joint R and steering-rod and handle connected thereto and adapted to operate both wheel-bars C D simultaneously is easily accommodated, and there is no danger of the vehicle being upset either sidewise or forward or backward. Furthermore, the construction of the frame E F G and the connected seat-frame H and lower lever-supports is such that all parts of the frame brace each other in a manner to easily bear any strains to which the vehicle may be subjected. The frame not only presents a symmetrical appearance, but is very light, allowing a vehicle accommodating four persons to be built in first-class style and weigh but one hundred and fifty pounds; hence, having but little dead weight in itself to be overcome by operation of the treadles and hand-levers, a maximum speed of the vehicle is attained with minimum effort on the part of the riders.

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

1. In a velocipede, the main frame constructed with a transversely-ranging frame, E, supported by the driving-wheel axle or axles, and bars F G, connected to said frame E and extending upward and forward and backward, respectively, to support an upper seat-frame, and said bars F G extended below to give support to the fulcrums of treadle-levers operated by riders on the upper seat-frame, substantially as herein set forth.

2. In a velocipede, the combination, with a

transversely-ranging frame, E, supported by the driving-wheel axle or axles, of a seat-supporting frame bar or bars pivotally connected to the frame E for lateral movement thereon, and a lower carriage forming part of or connected to the seat-supporting frame bar or bars and swinging therewith, treadle-levers fulcrumed on said carriage, and mechanism connecting said levers with the axle or axles of the machine, substantially as described, for the purposes set forth.

3. In a velocipede, the combination, with the main frame consisting of a frame, E, supported by the driving-wheel axle or axles, a frame bar or bars pivotally connected to the frame E for lateral swinging movement thereon, and a lower treadle-lever carriage forming part of or connected to the seat-supporting frame bar or bars and swinging therewith, of anti-friction rollers H′ H² on the seat-frame and lever-carriage, respectively, which move on the frame E and brace it in vertical position transversely of the machine, substantially as herein set forth.

4. In a velocipede, the combination, with a transversely-ranging frame, E, supported by the driving-wheel axle or axles, of two bars, F G, pivoted to the frame E for lateral movement, a frame, H, carrying front and rear seats, I J, and supported on said bars F G, and stay-bars F′ F′, connected to the lower ends of the bars F G, substantially as shown and described, whereby the laterally-movable frame F G F′, while supporting the seats, will also furnish support for treadle-levers operated by the riders on said seats and connected to the driving-wheels for propelling the machine, as herein set forth.

5. The combination, in a velocipede, of a frame, two transversely-ranging axles pivoted at or near their outer ends to said frame and guided for vertical movement at their inner ends, shafts journaled to the frames or supports of said axles and carrying driving-wheels at their outer ends, and connections from the inner ends of said axles and in control of the rider for leveling the axles on transversely-sloping or uneven roads, substantially as herein set forth.

6. The combination, in a velocipede, of a transversely-ranging frame, E, a seat-frame supported thereat, two axles, A B, pivoted at or near the ends of the frame E and guided for vertical movement at their inner ends, rotating shafts A⁴ B⁴ in the axles A B and carrying driving-wheels A′ B′, a rack, *n*, on the frame E, a pulley and gear-wheel, M N, journaled on the seat-frame, said gear-wheel engaging the rack *n*, and a chain or belt, O, on said pulley and connected at opposite ends to the inner ends of the axles A B, substantially as described, for the purposes set forth.

7. The combination, in a velocipede, of a transversely-ranging frame, E, frame-bars F G, pivoted thereon for lateral movement and adapted to support a seat-frame and extended below their pivot *e*³, stay-bars F′ F′, connected to the lower ends of the bars F G and forming with them a lower carriage, treadle-levers fulcrumed on said carriage, driving-wheels A′ B′, supported on axles A B, pivotally connected to the ends of the frame E, mechanism, substantially as described, connected with the inner ends of both axles and adapted for leveling the axles, treadle-levers fulcrumed on the lower frame-carriage, and mechanism connecting the driving-wheel shafts with these levers, substantially as shown and described, whereby the seat-frame and treadle-lever carriage will swing laterally as the axles are leveled by depressing the treadle-levers, as and for the purposes set forth.

8. The combination, in a velocipede, of a transversely-ranging frame, E, having a rack, *n*, front and rear diagonally-ranging bars, F G, pivoted on the frame E for lateral movement, a seat-frame, H, supported on the bars F G, a pulley and gear-wheel, M N, journaled on the frame, said wheel N engaging the rack *n*, axles A B, pivoted at or near the ends of the frame E and guided for vertical movement at their inner ends, rotating shafts A⁴ B⁴ in said axles and carrying driving-wheels A′ B′, a chain or belt, O, on said pulley M and connected at opposite ends to the inner ends of the axles A B, and said frame-bars F G extended below their pivot *e*³, bars F′ F′, connected to the bars F G and forming with them a lower carriage, treadle-levers fulcrumed on said carriage, pulleys on the driving-wheel shafts or axles, and belts connecting said pulleys with the treadle-levers, substantially as described, for the purposes set forth.

9. The combination, in a velocipede, and with a transversely-ranging frame, E, a seat-frame, H, supported thereat for lateral movement, and driving-wheels supporting said frame and mounted in axles pivoted to the frame E and connected at their inner ends to a device for leveling the axles, substantially as specified, of a latch device on the seat-frame engaging the frame E for locking the seat-frame at any desired lateral adjustment, substantially as herein set forth.

10. In a velocipede, the combination, with the main frame supported by side driving-wheels, of front and rear wheels, C′ D′, bars C D, connected to said wheels C′, a steering-bar jointed to the bars C D, and chains T, connecting the axles of the wheels C′ D′ or their bars C D with the axle or axles of the main side driving-wheels, substantially as described, for the purposes set forth.

11. In a velocipede, the combination, with the main frame supported by side driving-wheels, of front and rear wheels, C′ D′, bars C D, connected to said wheels C′ D′, respectively, a universal joint connected to said bars, and an axially-movable steering-bar con-

nected to the universal joint and in control of the rider for flexing said joint and operating both wheels C′ D′ simultaneously in steering the vehicle, substantially as herein set forth.

12. In a velocipede, the combination, with the main frame comprising a transverse frame, E, supported by side driving-wheels, of front and rear frame-bars, F G, having a forked construction at their upper parts, front and rear wheels, C′ D′, bars C D, connected to said wheels C′ D′, respectively, and passed through the forked parts of the bars F G as guides, a universal joint connected to the bars C D, and an axially-movable steering-bar, S, connected to the universal joint and in reach of the rider for flexing said joint and operating both wheels C′ D′ simultaneously, as herein set forth.

13. In a velocipede, the combination, with the main frame supported by driving-wheels, of front and rear wheels, C′ D′, bars C D, connected to said wheels C′ D′, coupling-sections R′ R^2, connected pivotally at *r* and pivoted to the bars C D by pins c^2 d^2, ranging at right angles to the pivot *r*, and an axially-movable steering-bar, S, connected to the pivot *r* and controllable by the rider, substantially as herein set forth.

14. In a velocipede, the combination, with the main frame supported by side driving-wheels and a seat-frame thereon, of front and rear wheels, C′ D′, bars C D, connected to said wheels C′ D′, respectively, a universal joint connected to said bars, an axially-movable steering-bar connected to the universal joint and in control of the rider, and a spring, T′, held at one end to the seat-frame and at its other end to the steering-bar, substantially as described, for the purposes set forth.

15. In a velocipede, the combination, with the main frame supported by side driving-wheels and supporting a seat-frame, of front and rear wheels, C′ D′, bars C D, connected to said wheels C′ D′, respectively, a universal joint connected to said bars, an axially-movable steering-bar, S, connected at one end to the universal joint and supported at its other end in a collar, S′, held to the seat-frame, and in which collar the bar S has axial and lengthwise movement, substantially as described, for the purposes set forth.

16. A velocipede constructed with two short axles, each supported pivotally at or near its outer end on a suitable frame and carrying a driving-wheel, and the inner ends of said axles connected to a device for leveling the axles, and side seats supported on said axles, substantially as herein set forth.

17. A velocipede constructed with two short axles, each supported pivotally at or near its outer end on a suitable frame and carrying a driving-wheel, and the inner ends of said axles connected to a device for leveling the axles, side seats supported on the axles, pulleys on the driving-wheel shafts of the axles, and treadle-levers fulcrumed on supports held to said axles and connected to the pulleys, substantially as herein set forth.

18. In a velocipede, the combination, with a frame, an axle or axles, and driving-wheels thereon, of side seats mounted on the axle or axles, clutch-pulleys on the shafts of the driving-wheels, treadle-levers fulcrumed on the axle or axles or on frames held thereto, and hand-levers, also fulcrumed on the axle or axles or on the frames thereon, and said treadle and hand levers geared together for simultaneous operation, substantially as shown and described, whereby both hand and foot power may be used to propel the vehicle, as herein set forth.

19. In a velocipede, the combination, with a frame, an axle or axles, and driving-wheels thereon, of seats mounted on the axle or axles, clutch-pulleys on the shafts of the driving-wheels, frames V, fixed to the axle-frames, treadle-levers fulcrumed to said frames and provided with segmental gear v^4, and hand-levers, also fulcrumed on the frames V, and having segmental gear v^3, meshing with the gear v^4, substantially as described, for the purposes set forth.

20. The combination, in a velocipede, of a transversely-ranging frame, E, a seat-frame supported thereat, two axles, A B, pivoted at or near the ends of the frame E and guided for vertical movement at their inner ends, rotating shafts A^4 B^4, journaled to the frames of the axles A B and carrying driving-wheels A′ B′, and a pulley and belt device connected with the inner ends of both axles and adapted for leveling the axles on transversely-sloping or uneven roads, substantially as described, for the purposes set forth.

21. The combination, in a velocipede, of a transversely-ranging frame, E, a seat-frame supported thereat, two axles, A B, pivoted at the ends of the frame E and guided for vertical movement at their inner ends, rotating shafts A^4 B^4 in the axles A B and carrying driving-wheels A′ B′, and mechanism, substantially as described, connecting the inner ends of the axles to the seat-frame, whereby as the axles are leveled the seat-frame will be shifted laterally on the main frame, as and for the purposes set forth.

22. In a velocipede, the combination, with a frame, two transversely-ranging axles pivoted at or near their outer ends to said frame and guided for vertical movement at their inner ends, shafts journaled to the frames or supports of said axles and carrying driving-wheels at their outer ends, and connections from the inner ends of said axles and in control of the rider for leveling the axles, substantially as specified, of clutch-pulleys on the wheel-shafts, levers fulcrumed on the frame or axles, and straps connecting the levers and clutch-pulleys, a pulley journaled on the

frame, and a cord or belt running on this pulley and connected at opposite ends to the driving-wheel clutch-pulleys, substantially as shown and described, whereby the pair of clutch-pulleys and levers will be reversed by downstroke of one of the levers and the clutch-pulley and lever connections will steady the inner ends of the driving-wheel shafts and axles, as and for purposes herein set forth.

CALVIN JACKSON.

Witnesses:
JOHN JACKSON,
GEORGE M. JACKSON.