(No Model.) 3 Sheets—Sheet 1.

S. ELLIOTT.

VELOCIPEDE.

No. 442,663. Patented Dec. 16, 1890.

Fig. 1.

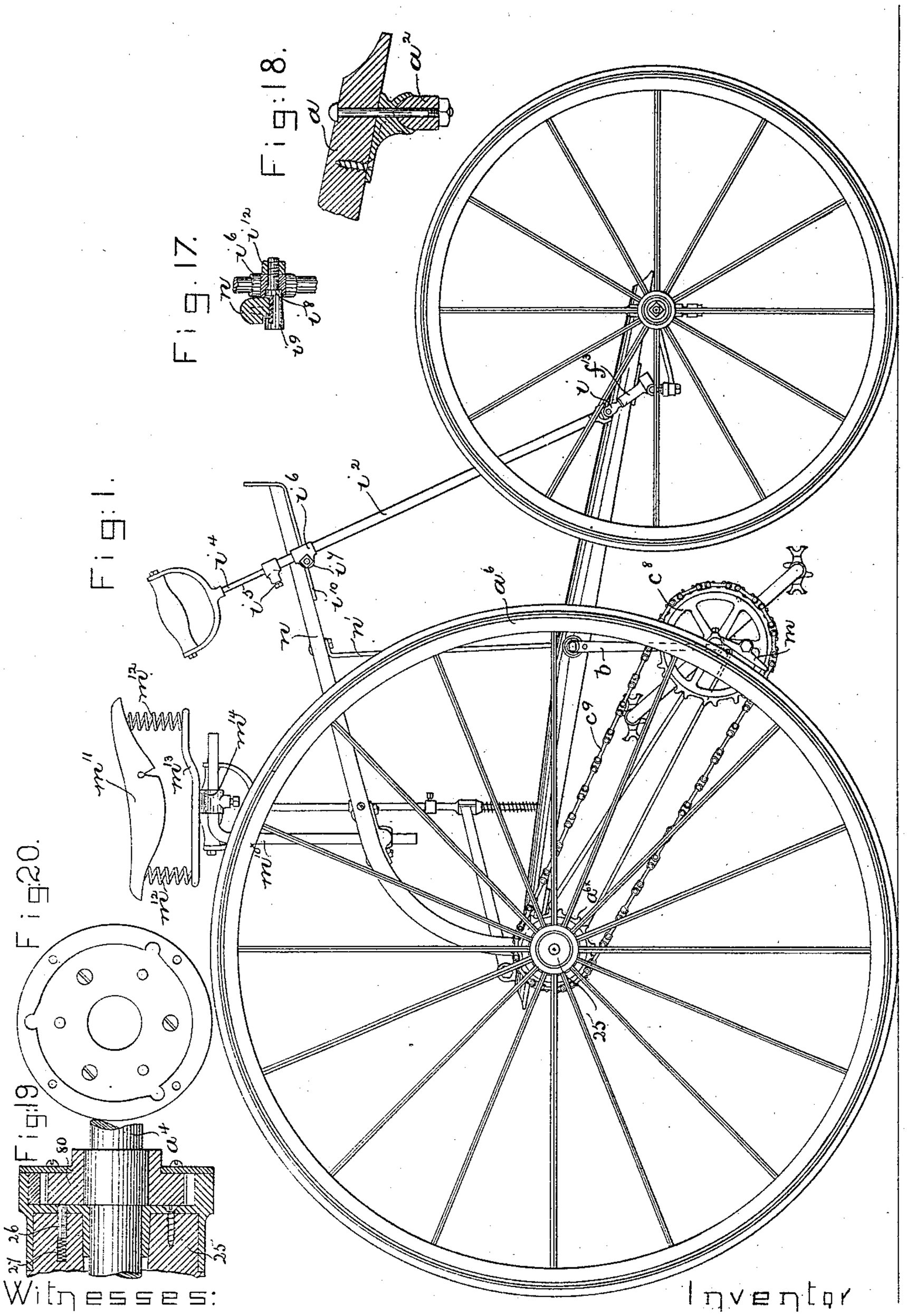

Fig. 17.

Fig. 18.

Fig. 19.

Fig. 20.

Witnesses:

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(No Model.) 3 Sheets—Sheet 2.

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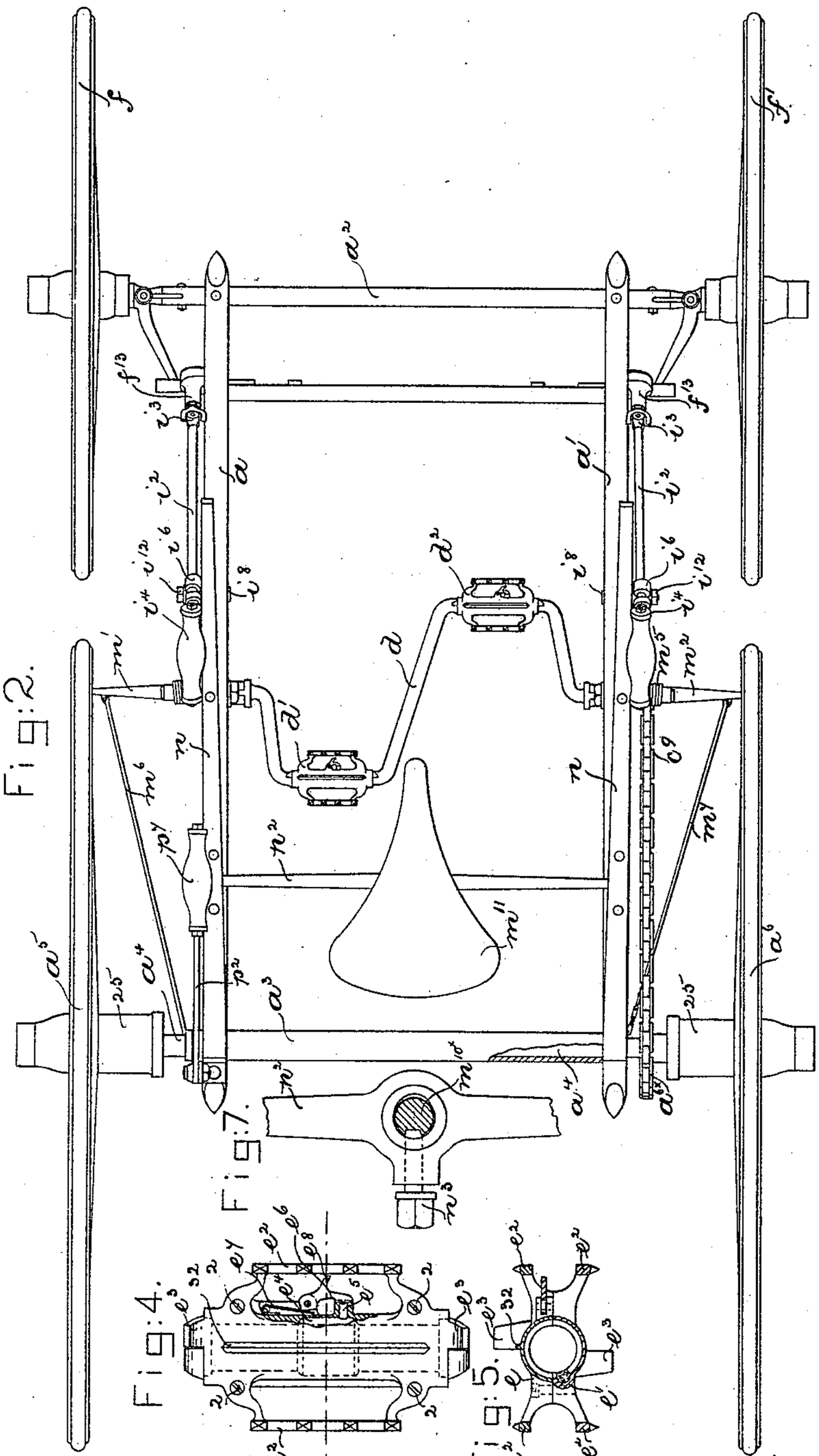

Fig: 2.

Fig: 4.

Fig: 5.

Fig: 6.

Fig: 7.

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No Model.)

3 Sheets—Sheet 3.

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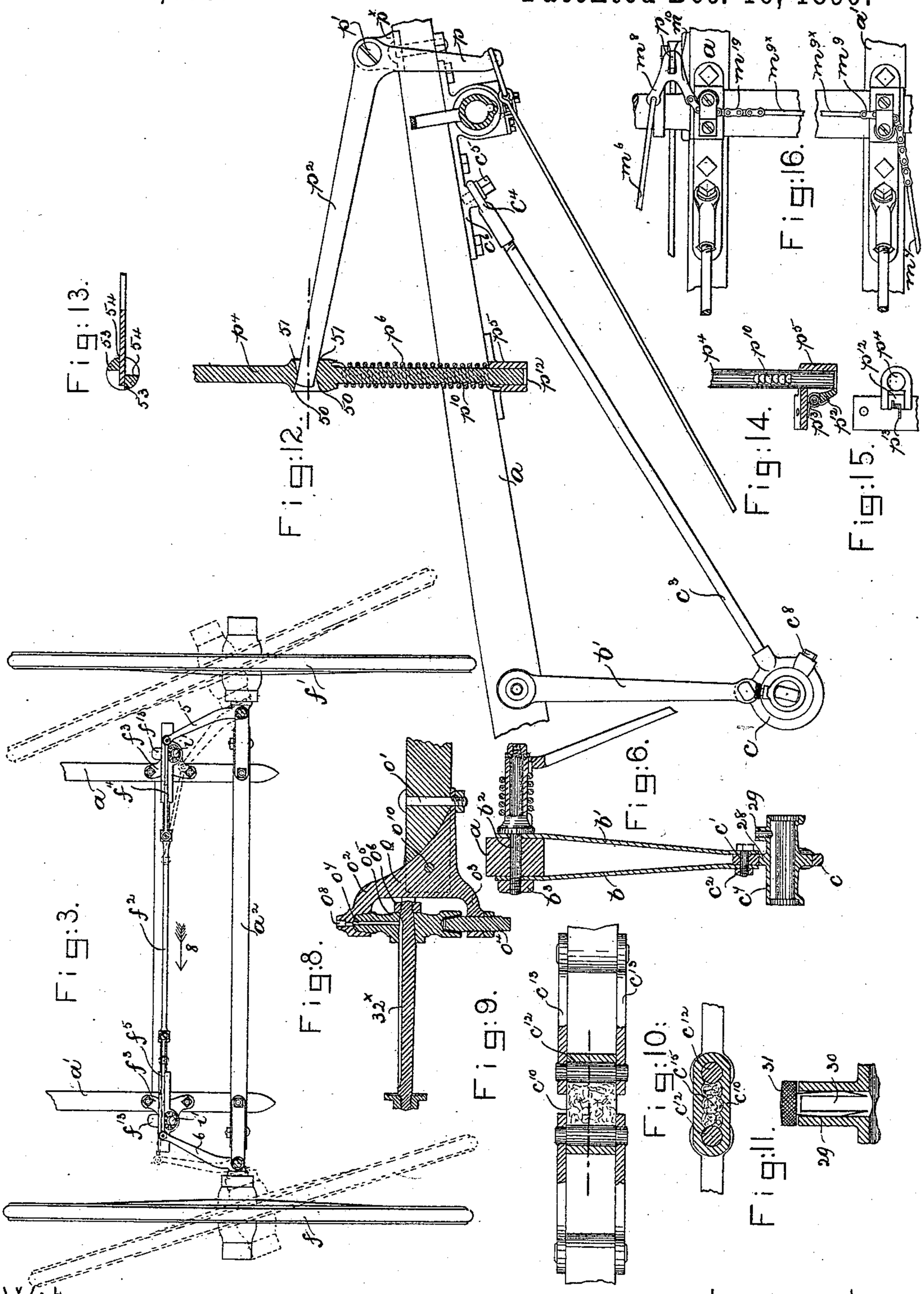

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UNITED STATES PATENT OFFICE.

STERLING ELLIOTT, OF NEWTON, MASSACHUSETTS.

VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 442,663, dated December 16, 1890.

Application filed July 16, 1888. Serial No. 280,021. (No model.)

To all whom it may concern:

Be it known that I, STERLING ELLIOTT, of Newton, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Velocipedes, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to improve the construction of quadricycles.

In accordance with this invention the driving-axle is propelled by driving mechanism operated by the feet of the rider, such mechanism comprising a double-cranked axle or shaft having thereon the foot-pedals and a sprocket-wheel, and another sprocket-wheel fixed to the driving-axle, and a chain passing around the said sprocket-wheels. The steering is effected by the forward wheels, which are moved upon vertical axes by means of hand-levers, such movement of the said wheels enabling one to describe a circle of shorter radius than the other, according to which direction they may be moved, so that in turning a corner the inside wheel may always follow the circular path of shortest radius. The brake mechanism comprises brake-shoes adapted to be brought in contact with or to co-operate with the driving-wheels, said brake-shoes being moved by a vertically-moving hand-lever connected therewith by intermediate connecting mechanism. The hand-lever for effecting the operation of the brake is designed to be locked when in contact with the wheels by simply a quarter-turn.

The mechanical construction of many of the parts comprising the different mechanisms are also improved in detail, as will be hereinafter more fully pointed out.

Figure 1 shows in side elevation a quadricycle embodying this invention; Fig. 2, a plan view of the machine shown in Fig. 1; Fig. 3, an under side view of the front end of the machine, showing particularly the steering mechanism; Figs. 4 and 5, enlarged details of the foot-pedals; Fig. 6, a vertical section of one of the frames supporting a bearing-box for the cranked axle; Fig. 7, an enlarged sectional detail of the L-pin and seat-support; Fig. 8, a longitudinal section of the pivoted or horizontally-swinging axle of one of the steering-wheels; Figs. 9 and 10, details of the sprocket-chain, to be referred to; Fig. 11, a sectional detail of the cap which closes the oil-cup of the bearing-box for the cranked axle; Fig. 12, an enlarged detail of the brake mechanism to be referred to; Figs. 13, 14, 15, and 16, details of the brake mechanism to be described; Figs. 17 and 18, details to be referred to; Fig. 19, a longitudinal section of a portion of one of the hubs of the wheel, and Fig. 20 a view of the interior face of the hub.

The main frame-work consists, essentially, of two parallel side bars $a\,a'$, one end of each bar resting upon the front axle-tree a^2, and the opposite end resting upon an axle-sleeve a^3, extending parallel with the axle-tree a^2.

The side bars a a', axle-tree, and other parts of the main frame are made of wood. Within the axle-sleeve a^3 is placed the driving-axle a^4, which has fixed to it at each end ratchet-toothed hubs or wheels 80, which are engaged by pawls loosely connected or pivoted to the interior of the hubs 25 of the wheels a^5 a^6. Each hub 25 (see Fig. 19) is bored to receive several plugs 26, which are held pressed against the side of the ratchet-wheels 80 by the springs 27, said plugs acting to prevent too free movement of the wheels independent of the ratchet-wheels. A sprocket-wheel $a^{6\times}$ is also fixed to the axle a^4 adjacent to the hub of one of the wheels, as a^6, for instance.

Intermediate the length of each side bar a a' a bracket or frame is attached, which bracket or frame consists, essentially, of two metallic plates or forgings $b\,b'$, (see Fig. 6,) secured one to each side of the side bar, being fixed thereto by a stud b^2 and nut b^3. At the lower end of the said bracket or frame a strap c is secured, as by a bolt c' and nut c^2. This strap c (see Fig. 12) is attached to or connected with a rod c^3, the opposite end of which rod is screw-threaded and enters an internally-screw-threaded eye c^4. A bolt c^5 passes through the eye c^4 and enters a forging or frame c^6 on the under side of the side bar, or it may be the side bar proper. The bolt c^5 holds the rod c^3 and strap rigidly in position, while it will be seen that by removing the bolt and rotating the eye c^4 the length

of the rod c^3 will be changed, so as to move the strap c toward or from the driving-axle, swinging the bracket or frame on its pivot b^2.

A bearing-box c^7, of any suitable construction and provided with a flange 28, having a slightly-curved face, is placed within the strap c and held by a set-screw c^8, the said strap having its interior face slightly curved to correspond with the face of the flange 28. The bearing-box has an oil-hole 29, (see Fig. 11,) which receives a plug having a spring-acting split shank 30 and a head 31, also, preferably, a longitudinal wick of absorbent material. (Not shown.)

A double-cranked axle or shaft d is placed between the side bars a a', the ends of said shaft having their bearings in the bearing-boxes c^7. A sprocket-wheel c^8 is fixed to one end of the shaft d in line with the sprocket-wheel $a^{6\times}$. A chain c^9 passes around the sprocket-wheels $a^{6\times}$ c^8 to transmit rotary motion, the tension of the chain being varied by moving the bracket b b' on its pivot b^2 by removing the bolt c^5 and turning the eye c^4. The chain c^9, which I prefer to employ, consists of several links c^{10}, (see Figs. 9 and 10,) each having an elongated slot or opening c^{15} through it and adapted at each end to receive and retain pins c^{12}. The slot or opening c^{15} between the pins c^{12} is filled with textile, fibrous, or any suitable material which may become easily saturated with oil. The ends of the pins c^{12} are rigidly connected with the side plates c^{13}. By this form of chain the pins c^{12} turn in the links and against the oily surfaces, so that a self-oiling chain is produced. Foot-pedals d' d^2 are loosely connected or mounted upon the double-cranked shaft d. The pedal which I prefer to use consists of two like plates e e', (see Figs. 4 and 5,) each having parallel foot-rests e^2 provided with sharp points or serrations, and also with upturned projections e^3 at the sides, by which the foot of the rider will be retained in position. The tread bars or plates e^2, are very much shorter than the full width of the pedal, as shown. Each plate e e' has also formed longitudinally on it a rib 32. The plates e e' are secured together by screws 2, inclosing the shaft d. The under or abutting faces of the plates at an intermediate point are counterbored, as at e^4, and one of the plates is provided with an oil-hole e^5, which is normally closed by a pivoted cap e^6, held down by a spring e^7, said cap having a projection e^8, by which it may be lifted when desired. The cap e^6 may be suitably padded. The hub of the cap e^6 is made angular to present two flat faces, and the spring e^7 normally bears against one side of the said angular hub, pressing the cap against the oil-hole, and when the cap is lifted the spring is compressed to enable the meeting-point of the said flat faces to pass by it, after which the cap will be held away from the hole by the same spring which bore against the other face. The other plate, as e', for instance, is grooved longitudinally to present an opening communicating with the shaft-receiving recess, which opening is filled with felt or other suitable oil-containing material.

The mechanism thus far described forms, essentially, the driving or propelling mechanism of the machine. At the forward end of the machine and upon the ends of the axle-tree a^2 are pivoted L-shaped arms or levers placed reversely and moving in substantially a horizontal plane, and normally the rearwardly-extended arms 5 6 of the said levers incline toward each other out of true parallelism, while the other arms 32 of the said levers normally lie in line with each other and with the axle-tree a^2, said arms serving as the axles, upon which the wheels f f' are loosely mounted. As a pivot for the L-shaped levers, I cut away or fork each end of the axle-tree a^2, (see Fig. 8,) and secure to the under side of the axle-tree at each end, as by a bolt o', a bracket or frame o, the web of said bracket or frame entering the recess at the end of the tree and receiving through it a bolt o^{10}. Each bracket or frame has an upper and lower arm o^2 o^3. The lower arm is bored to receive adjustably a pintle o^4, and the upper arm is recessed to receive the upper end of a spindle o^5, the lower end of said spindle being recessed to receive the upper end of the pintle o^4. The spindle o^5 is formed integral with or attached to one arm, as 6, of the L-shaped lever, while the arm $32^\times$ of said lever passes through the spindle transversely and is held as by a nut o^6. The upper portion of the spindle o^5 is bored, as at o^7, to serve as an oil-conveying passage, it communicating at its lower end with the groove of the axle or arm $32^\times$ and at its upper end with an oil-hole o^8. The oil-passage o^7 is offset from the oil-hole o^8, so as to present to the oil-hole o^8 a portion of the upper bearing of the spindle o^5, so that the oil may not only pass down through the passage o^7, but also lubricate the said bearing. A rod f^2 has its bearings in boxes f^3, secured to the under side of the side bars a a', said rod f^2 being made movable transversely thereto and parallel to the axle-tree a^2. The arms 5 6 of the L-shaped levers are connected with the rod f^2 respectively by links f^4 f^5, and as said rod f^2 is moved in one or the other direction both arms 5 6 will be moved to thereby turn the L-shaped levers on their pivots, and hence move the front wheels f f' on vertical axes, each of which is at the inside of and at right angles to the center of rotation of the said wheels. As the rod f^2 is moved in the direction indicated by the arrow S, Fig. 3, the arm 6 will be moved from its full toward or into its dotted-line position, the path of movement of said arm being nearly parallel to or in line with the direct thrust of the rod or at a slight angle, while the arm 5 will be moved toward or into its dotted-line position, and its path of movement will be in a much greater angle with relation to the said movement of the rod f^2.

It will be seen by reference to the dotted

lines referred to that the angular path described by the arm 6 will be less than that described by the arm 5, and as the arms 32 of the L-shaped levers upon which the wheels are mounted will be moved correspondingly the wheel f' will have a greater movement on its vertical axis than the wheel f with the same continuous movement of the rod f^2, when the said rod is moved in the direction of the arrow 8, referred to; but when said rod is moved in the opposite direction the wheel f will be moved on its vertical axis the greater number of degrees as compared with that of the wheel f', or precisely reverse to that above described.

Cylindrical bearings f^{13} are formed as a part of the bearing-boxes f^3, said bearings f^{13} receiving short shafts i, having at their lower ends toothed wheels i', which engage each a series of rack-teeth formed upon the rod f^2 near each end. Tubular rods i^2—one at each side of the machine—are connected at their lower ends with the short shafts i by a universal joint i^3, said tubular rods i^2 receiving at their upper ends hand-pieces i^4, which are made adjustable by the set-screws i^5 in usual manner. The rods i^2 pass through bearing-sleeves i^6, which have formed on them ears i^7, through which pass bolts i^8, having slotted and grooved heads i^9, (see Figs. 1 and 17,) each of which receives an under plate i^{10}, attached to the under side of the seat-supporting frame or arms n. The bearing-sleeve i^6 may be moved back and forth on the under plate i^{10} as a guide, and may be fixed in any desired position by tightening the nut i^{12}. By this construction it will be seen that by rotating either steering hand-piece i^4 the rod f^2 will be moved and the other hand-piece also moved correspondingly; and also it will be seen that the steering hand-pieces i^4 may be adjusted forward and backward at will.

The seat-support n consists of two bent arms rising from the side bars a a', said arms being supported near their forward ends by vertical brace-rods n', and having interposed between them a cross-bar n^2. The cross-bar n^2 has a hole through it of an irregular shape or other than round—such, for instance, as to resemble the shape of an egg. The usual L-pin $m^{10\times}$, circular in cross-section, passes down through the opening in the cross-bar n^2, (see Fig. 7,) and is held in position by a set-screw n^3. By shaping the hole as described and shown the L-pin will be pressed by the set-screw against the interior wall of the hole and thereby obtain a bearing in two points, so that it will be held rigidly. The seat m^{11} is mounted upon springs m^{12}, rising from a base-plate m^{13}, attached to a bearing-sleeve m^{14}, adjustably mounted upon the upper end of the L-pin.

The brake mechanism herein shown consists of brake-shoes m, one for each driving-wheel a^5 a^6, mounted, respectively, on the lower ends of two inclined bars, as m' m^2, loosely mounted on the ends or shank m^4 of the stud b^2. (See Fig. 6.) Springs m^5 encircle the hubs of the bars m' m^2, the tendency of which is to maintain the said bars in position to keep the brake-shoes away from the drive-wheels. Rods m^6 m^7 are connected at one end with the bars m^2 m', near their lower ends, the other end of one of the said rods, as m^6, being connected with one arm, as m^8, of a yoke, and the other end of the other rod, as m^7, being connected by a suitable chain m^9, link $m^{9\times}$, and chain m^{19} with the other arm m^{10} of the said yoke. The yoke m^8 m^{10} is attached to one arm, as p, of a bell-crank lever pivoted at p' to an arm $p^\times$, secured to the upper side of one of the side bars a'. The other arm p^2 of the bell-crank lever extends forward, and at its outer end enters a hole cut through the vertical rod p^4. The rod p^4 has its bearings in a sleeve or bracket p^5, attached to the under side of the bar a, and a spiral spring p^6 encircles a portion of the rod p^4, the tendency of which is to maintain the said rod in its most elevated position. The hole made through the rod or post p^4 is shaped to present an upper and lower horizontal angular surface, as best shown in Fig. 12, each surface comprising two flat faces, as 50 51, meeting at a central point. By this form the arm p^2, entering, as shown, and bearing against the lower flat face 51 and the upper flat face 50, limits the upward movement of both the rod p^4 and arm p^2. It will thus be seen that to apply the brakes the rod p^4, which is supplied at its upper end with a suitable hand-piece p^7, is depressed and the bell-crank lever turned on its pivot. The rod p^4, near its lower end, is provided with a series of teeth, as shown at p^{10}, Fig. 14, arranged on the side of the rod, and on the under side of the bracket p^5 a pawl p^{12} is pivoted, it being pressed by a spring p^{13} into engagement with the face of the rod. As the rod is depressed, by giving it a quarter-rotation the pawl p^{12} will engage one or another of the series of teeth p^{10}, and thereby lock the said rod depressed.

In order to enable the rod p^4 to be rotated a quarter-revolution, as described, the hole which receives the arm p^2 is cut to present vertical angular faces 53 54. (See Fig. 13.) When the rod p^4 is in its normal position, the arm bears against the flat faces 53 54, as shown, and when turned it will bear against the opposing faces.

By making the main frame-work of wood, as described, it is very elastic, yielding and twisting to compensate for any irregularities in the road.

The drive-chain herein shown and described is not herein specifically claimed, as it forms the subject-matter of another application, Serial No. 314,039.

I claim—

1. In a velocipede, the main frame-work, comprising the wooden side bars a a', the axle-tree a^2, and the axle-sleeve supporting the said side bars, and the wooden seat-supporting frame, comprising the wooden bars

n, combined with the steering rods or bars adjustably connected to the bars n, substantially as and for the purposes specified.

2. In a velocipede, the main frame-work, comprising the wooden side bars $a\ a'$, supported on the axle-tree a^2, and the axle-sleeve a^3, combined with the seat-supporting frame, comprising the wooden arms n, brace-rods n', and cross-bar n^2, and the steering-handles adjustable on the arms n, substantially as described.

3. In a velocipede, the driving-axle, having thereon at each end ratchet-toothed hubs, the wheels mounted on the said axle and having pawls which engage the teeth of the said ratchet-toothed hubs, combined with the spring-controlled plugs which bear frictionally against the side of said ratchet-toothed hubs, substantially as and for the purposes set forth.

4. In a velocipede, the double-cranked-axle-supporting frames and bearing-boxes having the rounded flanges 28, combined with the straps c, rod c^3, eye c^4, and the fastening, substantially as described.

5. In a velocipede, the foot-pedals composed of two like plates fastened together, each having front and back bars e^2 and projections e^3, the guide-bars e^2 being shorter than the distance between the projections e^3, substantially as described.

6. In a velocipede, the foot-pedals composed of the two like plates fastened together, each having the tread-bars e^2 and projections e^3, and counter-bored interiorly, as shown, one of the said plates having a groove e' and one of the said plates having an oil-hole closed by a spring-controlled cap e^6, substantially as described.

7. In a velocipede of the kind described, the steering-wheels, the pivoted L-shaped levers, upon one arm of which the said wheels are mounted, the other arms of said levers inclining toward each other, as described, and connected together to be moved simultaneously in either direction, and the rotatable steering-handles by which said L-shaped levers are moved, substantially as described.

8. In a velocipede, the steering-wheels, and the L-shaped levers pivoted to the axle-tree a^2, combined with the transversely-movable rod f^2, connecting one arm of each lever, the toothed wheel for moving the said rod, and the rotatable steering-handle for rotating the said toothed wheel, substantially as described.

9. In a velocipede, the steering-wheels, the L-shaped levers, and the rod f^2, connecting one arm of each said lever and having rack-teeth, combined with two toothed wheels i', engaging the rack-teeth, two rotatable rods i^2, and hand-pieces, substantially as described.

10. In a velocipede, the steering-rod universally connected with the steering mechanism and adjustable toward and from the rider, substantially as and for the purposes specified.

11. In a velocipede, the steering-rod jointed to the steering mechanism and made movable forward and backward, and a fastening for holding the said steering-rod in any position desired, substantially as described.

12. In a velocipede, two L-shaped levers having arms, as 6 $32^{\times}$, for the steering-wheels, each having the pintle o^5, turning in the two-armed bracket o, fixed to the axle-tree a^2, substantially as described.

13. In a velocipede, two L-shaped levers having arms, as 6 $32^{\times}$, for the steering-wheels, each having the pintle o^5, having an oil-passage o^7, combined with the bracket o, having two arms, between which the pintle has its bearings, one of the said arms having an oil-hole communicating with the oil-passage o^7, substantially as described.

14. In a velocipede, the brake-shoes supported on pivoted arms, rods for moving said arms, and a bell-crank lever for moving the rods, combined with the vertically-movable rod for the said bell-crank lever, substantially as described.

15. In a velocipede, the brake-shoes supported on pivoted arms, rods for moving said arms, and a bell-crank lever, combined with the brake-rod having the hole through it shaped as shown and described, whereby vertical movement of said rod is limited, substantially as described.

16. In a velocipede, the brake-rod having a hole through it, as shown, to receive the brake-operating lever, said hole being so shaped as to permit the rod to be partially rotated, substantially as described.

17. In a velocipede, the cross-bar or frame having a hole or socket one of the diameters of which is greater than another, combined with a seat-support circular in cross-section, to enter the said hole or socket, substantially as described.

18. In a velocipede, the brake-rod movable vertically to apply the brake-shoes and having notches at or near its end at one side only, combined with a spring-controlled pawl for engaging said notches to lock the brake when the rod is turned, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

STERLING ELLIOTT.

Witnesses:
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F. L. EMERY.