(No Model.)

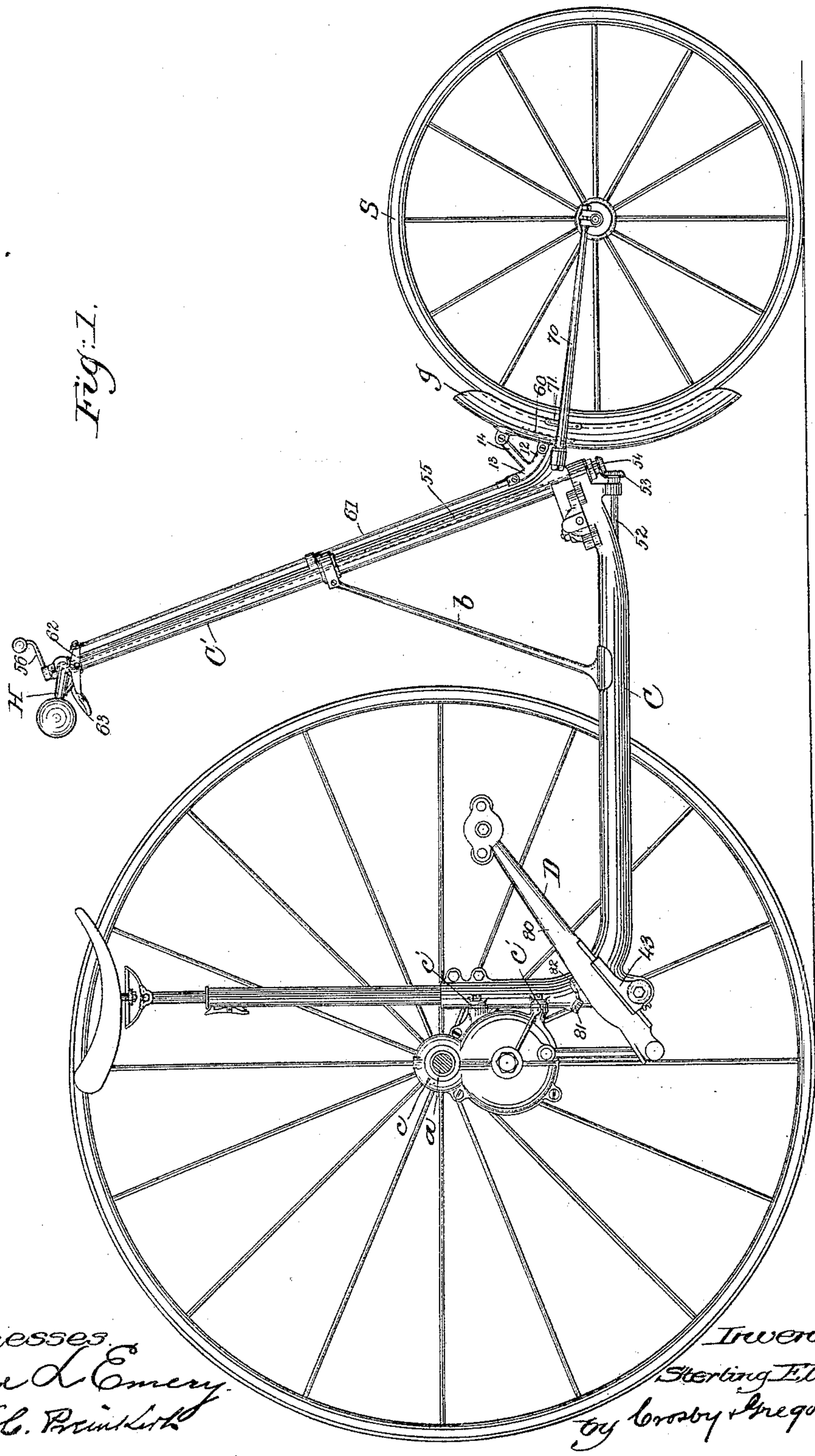
3 Sheets—Sheet 1.

S. ELLIOTT.

TRICYCLE.

No. 446,671. Patented Feb. 17, 1891.

Fig. 1.



Witnesses.
Fred L. Emery.
John F. C. Prindiville

Inventor:
Sterling E. Elliott.
by Crosby & Gregory Attys

(No Model.) 3 Sheets—Sheet 2.

S. ELLIOTT.

TRICYCLE.

No. 446,671. Patented Feb. 17, 1891.

Fig. 6.

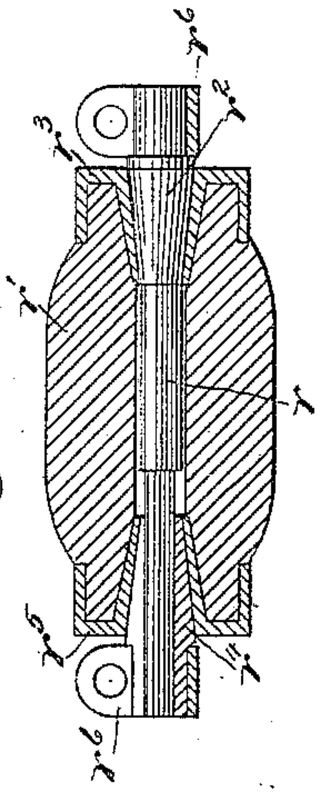


Fig. 2.

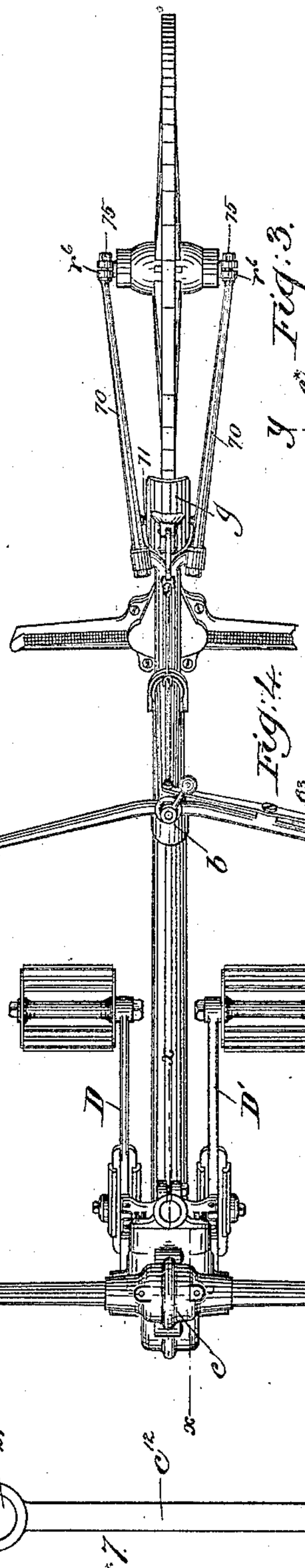


Fig. 3.

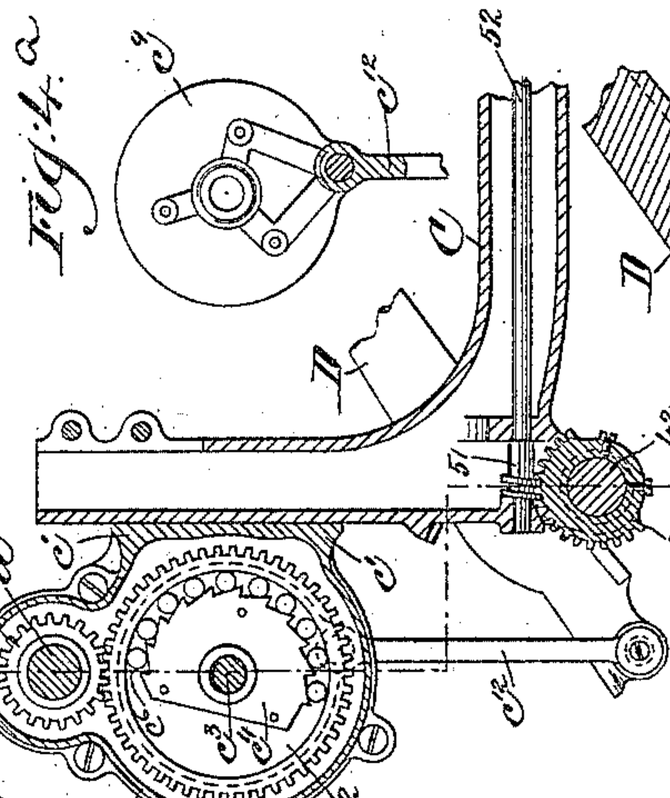


Fig. 5.

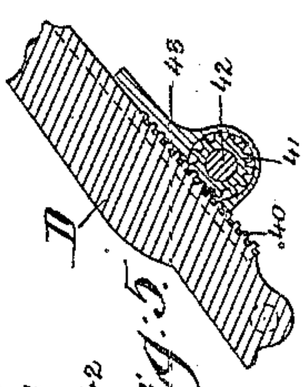


Fig. 4.

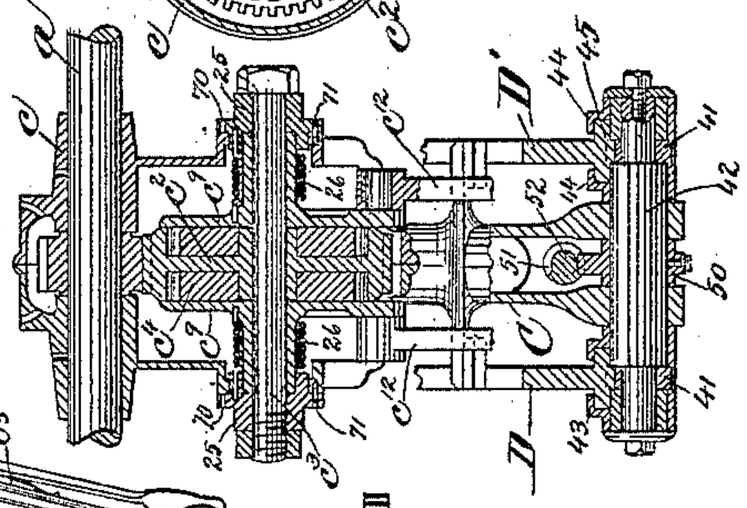


Fig. 1.

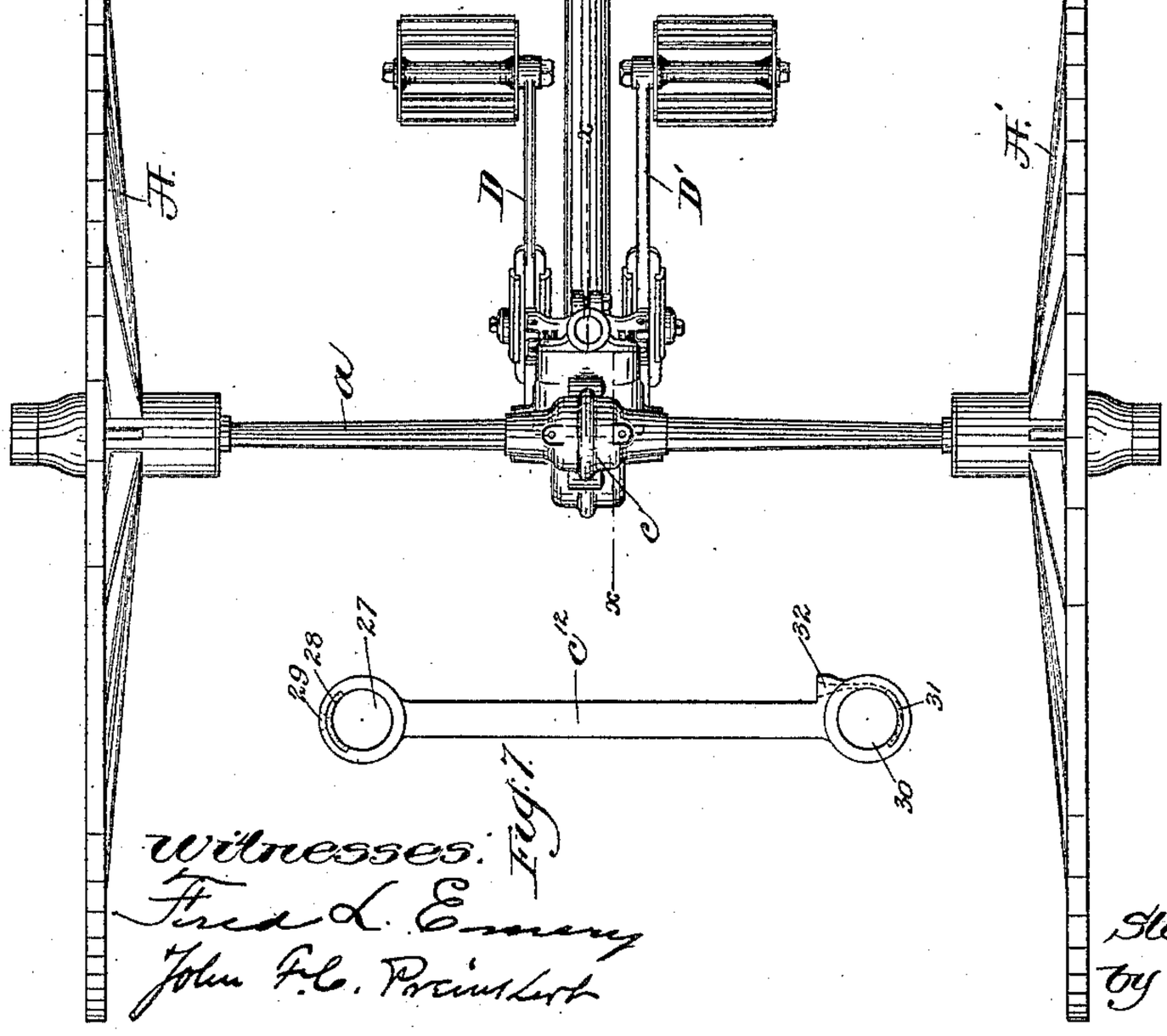
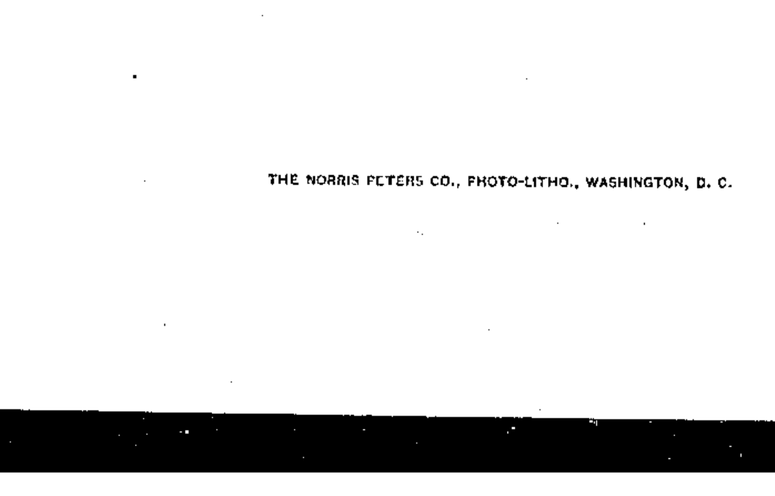


Fig. 7.



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by Crosby & Gregory Attys.

(No Model.)

3 Sheets—Sheet 3.

S. ELLIOTT.

TRICYCLE.

No. 446,671. Patented Feb. 17, 1891.

Fig: 10.

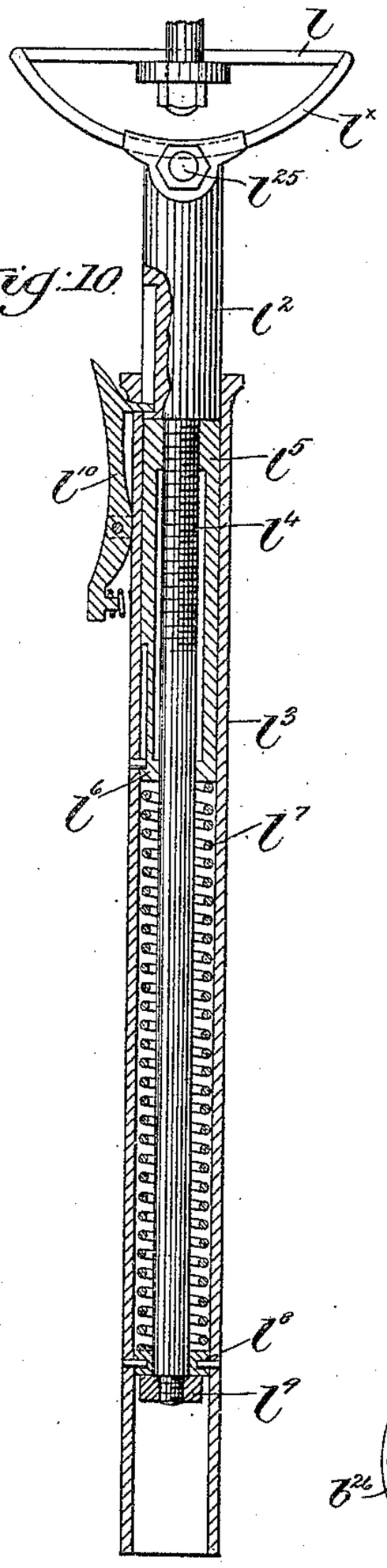


Fig: 11.

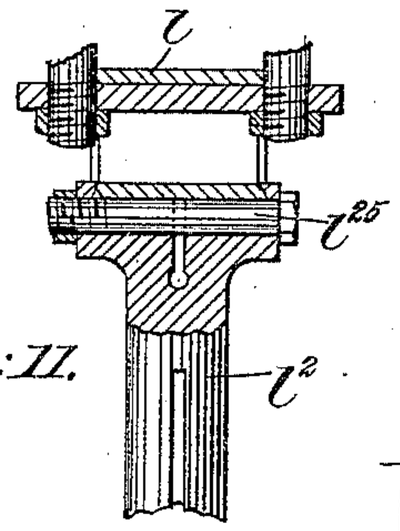


Fig: 12.

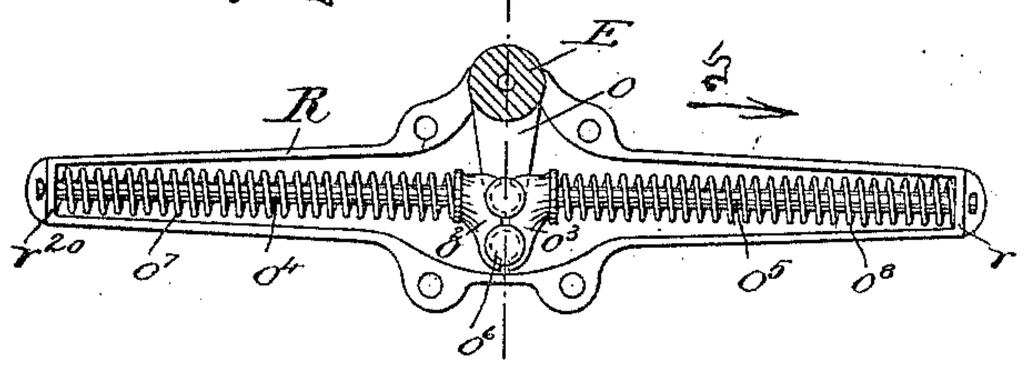


Fig: 13.

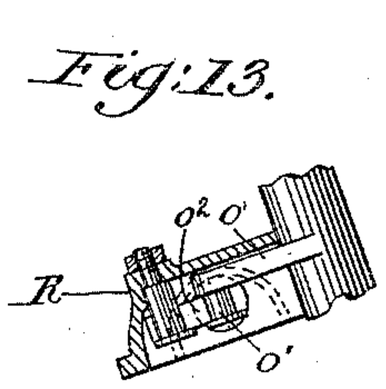


Fig: 8.

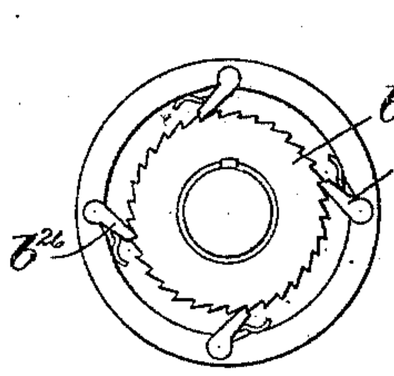
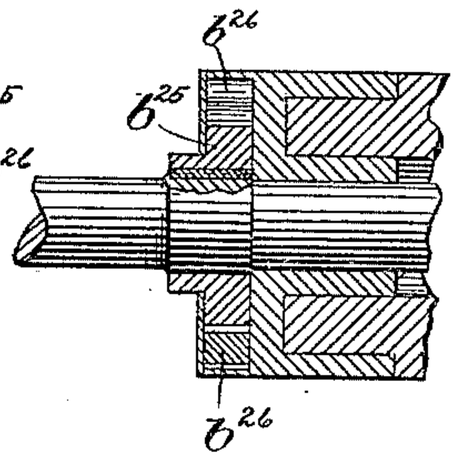


Fig: 9.



Witnesses.
Fred L. Emery.
John F. C. Purcell Lott

Inventor.
Sterling Elliott.
by Crosby & Gregory Attys.

UNITED STATES PATENT OFFICE.

STERLING ELLIOTT, OF NEWTON, MASSACHUSETTS.

TRICYCLE.

SPECIFICATION forming part of Letters Patent No. 446,671, dated February 17, 1891.

Application filed April 26, 1887. Serial No. 236,151. (No model.) Patented in England September 15, 1886, No. 11,727, October 18, 1886, No. 13,273, December 17, 1886, No. 16,584, and April 30, 1887, No. 6,304; in France October 22, 1886, No. 179,183; in Belgium October 23, 1886, No. 74,946, and in Germany January 4, 1887, No. 40,387.

To all whom it may concern:

Be it known that I, STERLING ELLIOTT, of Newton, county of Middlesex, and State of Massachusetts, have invented an Improvement in Tricycles, (for which Letters Patent have been granted in the following countries, namely: England, No. 13,273, October 18, 1886; No. 16,584, December 17, 1886; No. 11,727, September 15, 1886, and No. 6,304, April 30, 1887; Belgium, No. 74,946, October 23, 1886; France, No. 179,183, October 22, 1886, and Germany, No. 40,387, January 4, 1887,) of which the following description, in connection with the accompanying drawings, is a specification, like figures and letters on the drawings representing like parts.

This invention has for its object to construct a velocipede which is an improvement upon the velocipede described in applications for Letters Patent, Serial No. 203,216, filed May 25, 1886, and Serial No. 217,766, filed November 2, 1886, to which applications reference may be had.

In accordance with this invention the main axle is rotated by a clutch mechanism which is actuated by the driving mechanism, the said driving mechanism consisting of pedal-levers having variable fulcra to thereby change the radius of each lever when the latter is moved to rotate the main axle. The fulcra of the pedal-levers are also made adjustable to increase and decrease the leverage at will, the mechanism employed to adjust the said fulcra being readily accessible to the rider.

Many other improvements are made in the detail of construction of the machine, which will be hereinafter more fully pointed out.

Figure 1 shows in side elevation a velocipede embodying this invention, one of the drive-wheels being removed; Fig. 2, a top view of the velocipede; Fig. 3, a vertical section of the clutch mechanism and its co-operating parts, taken on the dotted line $x\ x$, Fig. 2; Fig. 4, a vertical section of the parts shown in Fig. 3, taken on the dotted line $y\ y$. Fig. 4^a is a side elevation of one of the plates c^9 and its attached pitman; Figs. 5, 6, and 7, details to be referred to; Figs. 8 and 9, details of the ratchet-clutch mechanism employed to rotate the drive-wheels; Fig. 10, a vertical section of the saddle and its supporting-frame; Fig. 11^a, a front elevation of a portion of the saddle, and Figs. 12 and 13 under side and sectional views of the centering devices for the steering-wheel.

The main rotating shaft or axle a, carrying the drive-wheels A A′, has its bearings in a frame c, secured to the main frame or bar c by short arms c'.

The shaft a is rotated continuously by a clutch mechanism, which consists of a toothed wheel $c^\times$, fixed to the axle a, and another intermeshing toothed wheel c^2, of larger diameter than the toothed wheel c, mounted upon a rod c^3, having its bearings in the shell-like frame c. The toothed wheel c^2 is provided upon each side with a laterally-projecting flange to thereby form a chamber or recess to receive the ratchet-toothed disk c^4, mounted upon the rod c^3 at each side of the toothed wheel c^3.

A series of rolls or balls c^6 are placed one between each tooth of the ratchet-toothed disk c^4 and the flange of the toothed wheel, to thereby frictionally engage one with the other when the ratchet-wheel is turned in one direction, but to enable the said ratchet-wheel to be turned in the opposite direction freely.

Two exterior disks or plates c^9 are secured one to each ratchet-toothed wheel c^4 by suitable pins, the said plates being also mounted loosely upon the rod c^3 within the shell-like frame c. The plates c^9 are reciprocated, to thereby reciprocate the ratchet-toothed wheels, by means of pitmen c^{12}, loosely connected at one end to wrist-pins projecting from the plates. (See Fig. 4^a.)

The rod upon which the toothed wheel c^2, the ratchet-toothed wheel c^4, and the plates c^9 are mounted is herein shown as composed of a bolt c^3, passing through the shell-like frame from side to side, a collar 25 being slipped upon the bolt next to the head, and a similar collar 25^a slipped upon the bolt next to the locking-nut.

The collars 25 and 25^a are alike, each being

provided with a series of holes 70, and the shell-like frame which incloses and gives bearing for the clutch-operating parts is provided at each side with a pin 71, which enters one or another hole 70 in the collars, to thereby lock the collars in any position to which they may be adjusted.

A spiral spring 26 surrounds the hub of each plate c^9, one end of each spiral spring being attached to the plates and the opposite ends to the collars 25, the function of the springs being to return the plates to their normal position after having been moved by the pitmen. The tension of the springs 26 may be changed by simply loosening the nut upon the bolt and turning one or the other collar 25, as occasion may require, in one or the other direction, the collars being locked in any position by the pins 71.

The pitmen c^{12} are connected, respectively, to the outer ends of the pedal-levers D D′, each pitman consisting of a bar (see Fig. 7) having at one end an eye 27, provided with a felt or packing receiving chamber 28 and an oil-well 29, and at its opposite end with an eye 30, which also has a packing-receiving chamber or recess 31 and an oil-receiver 32.

Many of the parts thus far described are quite analogous to the parts represented by similar reference-letters in the application, Serial No. 203,216, above referred to.

Each pedal-lever D D′ is provided upon its under side with a series of rack-teeth 40, which engage the teeth of a wheel 41, fixed to a shaft 42, having its bearings in a projecting portion of the frame C. Each pedal-lever is retained in engagement with the teeth of the wheels 41 by a casing 43, mounted loosely upon the rod or shaft 42, and having two flanges 44, which overlap flanges 45 of the pedal-levers. As the pedal-levers are thus firmly held in engagement with the toothed wheels 41 by the flange-casings when the said levers are depressed, it will be seen that they rock over the said toothed surfaces of the wheels. As the pedal-levers are thus depressed by rocking over the curved surfaces, as described, their radius gradually diminishes until arriving in their lowermost position, and their radius gradually increases as they are raised, the said curved surfaces 41 thereby serving as variable fulcra for the levers. As the levers are rocked upon the variable fulcra the casing 43 holding them will be turned on its pivot, and such pivot being the center of the arc of the circle forming the fulcra for the pedal-lever the said levers will slide in the casing when moved.

Were it not for another function of the toothed wheels or surfaces 41, now to be described, they might be made merely as curved surfaces, either toothed or serrated, or otherwise given a connection with the pedal-levers to prevent the said levers slipping when acted upon.

As it is oftentimes desirable to adjust the fulcra for the pedal-levers to obtain greater or less leverage, means are provided for accomplishing this result, such means herein consisting of a toothed sector 50, fixed to the rod or shaft 42, and a worm 51, secured upon a rotatable shaft 52, engages the teeth of the sector 50 to thereby rotate the shaft 42 when desired.

The worm-shaft 52 has fixed to its opposite end a beveled gear 53, Fig. 1, which is engaged by a beveled gear 54, fixed to a shaft 55, (see dotted lines, Fig. 1,) extending vertically through the frame.

A hand-crank 56, located adjacent to the handle-bar H, is fastened to the upper end of the shaft 55, so that by rotating the crank the worm-shaft 52 will be rotated. Thus both adjustable and variable fulcra are provided.

The pedal-levers D are shaped to present one side or face, as 80, as composed of two parts whose surfaces are parallel to each other, but inclined to the lower side of the pedal-levers, the two parts being joined by a suitable curved portion, and to the framework of the machine just above the pedals two stops 81 82 are fixed, against which the inclined faces of the pedal-levers strike to limit the upward and downward movement of the levers. The stops 81 82 are preferably located one at each side of the fulcra of the levers, and the contact or outer faces of the stops are arranged to co-operate accurately with the inclined faces of the pedals. The outer or contact faces of the stops 81 82 may, if desired, be made convex, or, if deemed more efficient, the faces of the stops may be made inclined, and the faces or sides of the pedal-levers, which are herein shown as inclined, may be made straight or parallel; but to gain the full benefit which it is preferable to be derived both the co-operating faces of the levers and stops should be tangential, so that when the levers are adjusted to vary the leverage the pedals proper will be moved horizontally.

The handle-bars H, secured to the upper end of the upright frame C, are bent rearwardly or toward the rider's seat, to thereby permit the upright frame C to occupy a more nearly vertical position and yet bring the handle-bars within easy reach of the rider.

The brake herein shown consists of a brake-shoe 60, (see dotted lines, Fig. 1,) pivoted loosely to one arm, as 12, of a three-armed lever composed of the arms 12, 13, and 14. The three-armed lever is pivoted by its arm 14 to the mud-guard g, secured between the two rods or bars 70, forming the fork carrying the steering-wheel, by a short connecting-rod, as 71. The three-armed lever, or it may be a bell-crank lever, is moved on its pivot by a rod 61, extending upward parallel with the frame C′ and connected at its upper end to one end of a pivoted hand-lever 62. The hand-lever lies beneath and parallel with the handles H and is controlled by a spring 63, which maintains the rod 61 in elevated position.

When it is desired to apply the brake, the

hand-lever 62 is moved by the rider, forcing downward the rod 61 and permitting the brake-shoe to come in contact with the periphery of the steering-wheel S.

The steering-wheel S has an adjustable bearing arranged to take up the wear, which consists of a rod r, (see Fig. 6,) extending through the hub r' of the wheel, the said rod r having a conical or tapering portion r^2, which snugly fits the conical or tapering cap r^3, secured to one end of the hub r', while the opposite end of the rod r has its bearing in a conical or tapering tubular split plug r^4, snugly entering the tapering cap r^5 at the opposite side of the hub similar to the cap r^3. The said rods 70, forming the steering-wheel fork, are provided at one end with split bearing portions r^6, in which the rod r^2 at one end of the hub r' and a tapering plug r^4 at the opposite end of the hub bear, so that by simply loosening the nut, as 75, the wear consequent upon the rotation of the steering-wheel may be taken up by the tapering plug r^4.

A brace-rod b is secured to the frame C to support the frame C'.

The drive-wheels A are joined with the main axle a by ratchet-clutch connections consisting of a ratchet-wheel b^{25} and spring-controlled pawls b^{26}, as shown in Figs. 8 and 9, which, being similar to that shown and described in application Serial No. 203,216, need not herein be described.

The saddle is fastened by two bolts to the upper part of a saddle-support l, said saddle-support consisting of a curved piece of metal $l^\times$, having beveled side edges which enter a correspondingly-shaped recess cut in the upper end of a rod l^2. The rod l^2 is slitted vertically at its upper end and bored transversely to receive a bolt l^{25}, by which the extreme upper ends of the rod l^2, divided by the slit, may be drawn or clamped together to firmly lock or retain the saddle-support in any desired position. The supporting part $l^\times$ of the saddle-support being curved, as shown, the saddle may be tilted as it is moved. The rod l^2 is fitted within a tube l^3, adjustably connected with the frame C. The rod l^2 for a portion of its length within the tube l^3 is reduced in diameter and screw-threaded, as at l^4, to engage a sleeve-like nut l^5, placed in and made freely movable vertically within the tube l^3. The sleeve l^5 is slotted at one side to receive a pin or stud l^6, projecting inwardly from the tube l^3, the said slot being of sufficient length to permit the sleeve l^5 to rise and fall to any desired extent, but not to rotate. The sleeve l^5 bears upon a spring l^7, encircling the lower portion of the rod l^2 within the tube l^3, the lower end of the said spring bearing against a bridge or cross-bar l^8 near the lower end of said tube in which the end of the rod l^2 has its bearings. A spring-controlled latch l^{10} is pivoted to the upper end of the tube l^{13}, the said latch having a projecting point or stud which enters a groove cut in the side of the said rod l^2 to thereby prevent the said rod from rotating. The nut l^9 is screwed upon the lower end of the rod l^2 beneath the bridge or cross-bar l^8. It will be seen that as a heavy weight is placed upon the seat the rod l^2 will descend against the tension of the spring l^7. To compensate for different weights the spring-controlled latch l^{10} may be disengaged from the rod l^2 and the latter rotated in one or the other direction by turning the saddle, causing the screw-threaded portion $l^\times$ to turn within the sleeve, thereby causing the latter to rise and fall, the effect of which is to either compress the spring l^7 or to permit the same to distend.

The seat-support constructed as above described is adjustable vertically for different heights, is yielding, may be tilted back and forth, and also the seat proper may be moved toward and from the handle-bar.

The centering device for the steering-rod is substantially the same as shown in the application referred to, it consisting of a short arm o, secured to the lower end of the steering-rod E, said arm having a projecting pin or stud o', which strikes against the heads o^2 o^3 of rods o^4 o^5, located upon the under side of a hollow foot-rest R, and having their bearings in the downwardly-turned ends r^{20} thereof. The heads o^2 o^3 of the said rods are normally pressed against the said pin or stud o^6, fixed to the center of the foot-rest R, by springs o^7 o^8, one end of each spring bearing, respectively against the heads and the other bearing against the downwardly-turned ends r^{20} of the foot rest.

By this construction it will be seen that as the short-arm is turned in one or the other direction by the steering-rod—as, for instance, that indicated by the arrow 25—its pin or stud o' will strike against the block o^3, moving the rod o^5 against the tension of the spring o^8, while the block o at such time bears against the stud o^6, so that only one spring is pressed at a time by the movement of the steering-rod in one or the other direction to thereby supply the power required to turn the steering-wheel into its normal position.

I claim—

1. In a velocipede, the main axle and clutch mechanism for rotating it, combined with the driving mechanism consisting of the pedal-levers having variable fulcra.

2. In a velocipede, the combination, substantially as described, of the main axle and clutch mechanism for rotating it, the pedal-levers having variable fulcra, and devices for adjusting the variable fulcra.

3. The shaft or axle and means for rotating it and the pedal-levers for operating said means, combined with fulcra for the pedal-levers, having curved surfaces over which the said pedal-levers rock.

4. In a velocipede, the main axle and clutch mechanism for rotating it and the pedal-levers for operating the clutch mechanism, combined with fulcra for the pedal-levers and with means for adjusting the said fulcra, the said

adjustable devices being operable by the hand of the rider in proximity to the handle-bar, substantially as described.

5. In a velocipede, the main axle and clutch mechanism for rotating it and the pedal-levers for operating the clutch mechanism, combined with variable fulcra for the pedal-levers, and a casing, as 43, in which the pedal-levers move when moving tangentially upon the movable fulcra, substantially as described.

6. In a velocipede, the main axle and clutch mechanism for rotating it, combined with reciprocating disks operated by the driving mechanism for operating the clutch mechanism, and the springs 26 for controlling the movement of the reciprocating disks, one end of each spring being attached to the reciprocating disk c^9 and the other end to the adjustable collar 25, substantially as described.

7. In a velocipede, the main axle and clutch mechanism for rotating it, combined with the reciprocating disks for operating the clutch mechanism, the driving mechanism therefor, the springs 26, controlling the movement of the said disks, and a rotatable collar 25, for varying the tension of the springs 26, substantially as described.

8. In a velocipede, the main axle and clutch mechanism for rotating it, combined with the reciprocating disks for operating the clutch mechanism, the springs 26, controlling the movement of the said disks, and a rotatable collar 25, for varying the tension of the springs 26, and a locking device for the rotatable collar, substantially as described.

9. In a velocipede, a tubular frame C and a rearwardly-inclined upright frame C′, combined with the shell-like frame or casing c, in which the main axle has its bearings, the brace-rod b, and the rearwardly-extended handle-bars H, substantially as described.

10. In a velocipede, the steering-wheel and its fork, combined with the rod r, having the tapering portion r^2 and fastened to the steering-fork, the tapering plug r^4, and the two conical or tapering caps r^3 r^5, secured to the hub of the steering-wheel, in which the tapering portion r^2 of the rod and the tapering plug r^4 snugly fit, substantially as described

11. In a velocipede, the steering-wheel and the fork carrying it and the mud-guard g, combined with the pivoted brake-shoe, the pivoted lever carrying it, the rod 61 for moving the pivoted lever, and the operating-lever 62 for moving the rod 61, substantially as described.

12. In a velocipede, the yielding rotating seat-support and the tilting saddle-support and seat, combined with a locking device to lock the rotating seat-support, substantially as described.

13. In a velocipede, the seat-support and the saddle-support composed of the single curved portion $l^\times$ and straight top piece l, combined with a seat mounted upon the said top piece, substantially as described.

14. In a velocipede, the seat-support slitted at its upper end and recessed, combined with a saddle-support, its curved portion entering the recess at the upper end of the seat-support, and the transverse clamping-bolt l^{25} for locking the saddle-support in any desired position, substantially as described.

15. The pedal-levers, combined with two limiting-stops located above the levers and adapted to engage the said levers at each side of their fulcra, substantially as and for the purpose described.

16. In a velocipede, two limiting-stops for each pedal-lever, combined with the pedal-levers, each having on one side two inclined or angular surfaces to co-operate, respectively, with or engage the limiting-stops, substantially as described.

17. In a velocipede, two limiting-stops for each pedal-lever, located above and at each side of their fulcra, combined with the pedal-levers, each having upon one side two inclined or angular parallel surfaces to co-operate with the said stops, the point of junction of the two surfaces being between the limiting-stops, and to operate substantially as described.

18. In a velocipede, the main axle and clutch mechanism for rotating it and the pedals D, combined with the pitmen c^{12}, provided at each end with eyes 27 30, and felt packing 28 31, contained in recesses cut in the eyes for a portion of their length, substantially as and for the purpose set forth.

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

STERLING ELLIOTT.

Witnesses:
B. J. NOYES,
F. L. EMERY.