(No Model.) 2 Sheets—Sheet 1.

E. HERRINGTON.

TRICYCLE.

No. 523,638. Patented July 24, 1894.

Fig. 1.

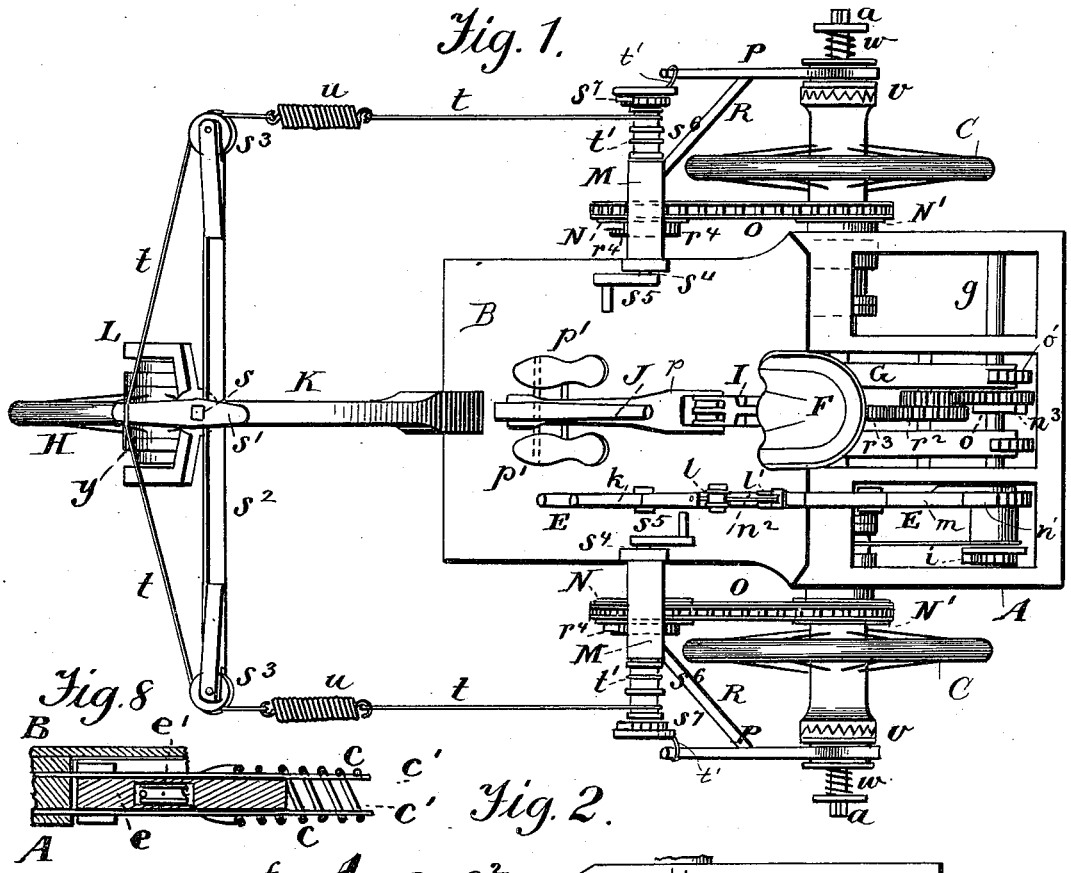


Fig. 8

Fig. 2.

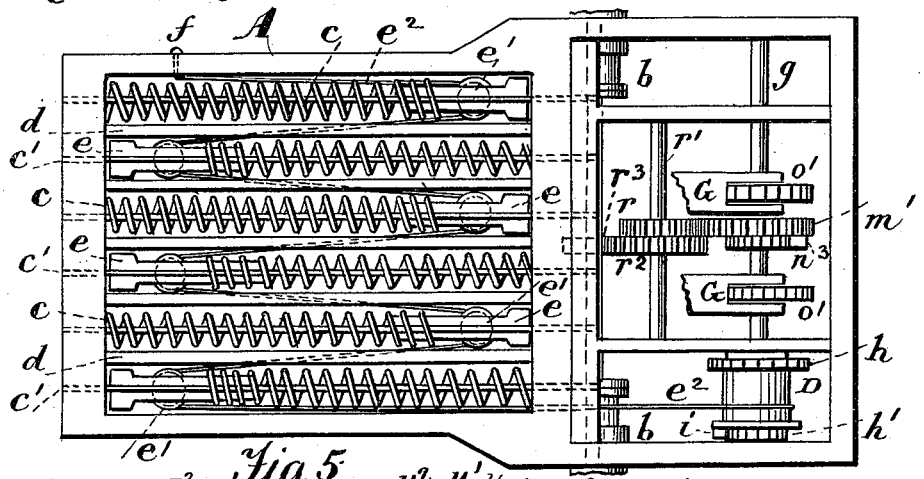


Fig. 5.

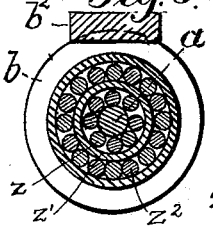
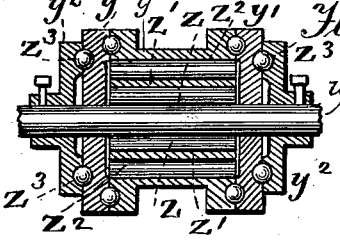


Fig. 6.



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(No Model.) 2 Sheets—Sheet 2.

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TRICYCLE.

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Fig. 3.

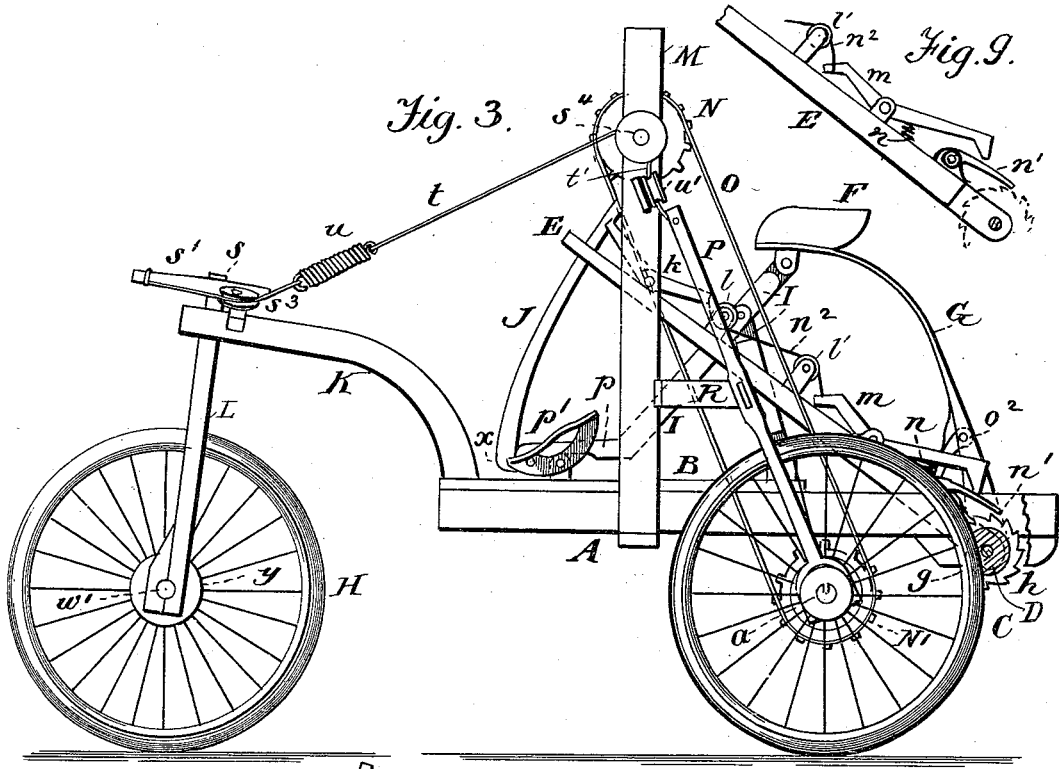


Fig. 9.

Fig. 4.

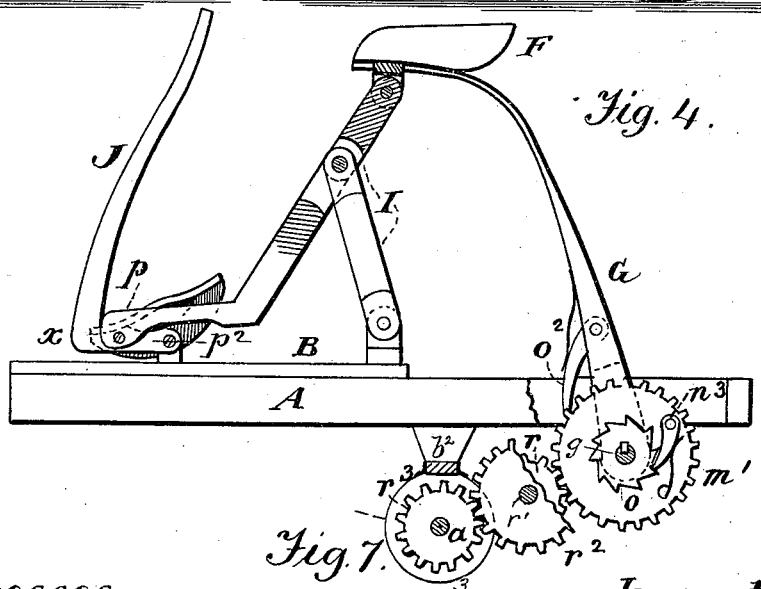
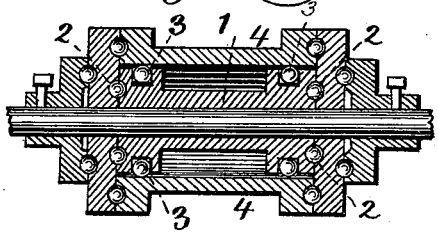


Fig. 7.



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UNITED STATES PATENT OFFICE.

EPHRAIM HERRINGTON, OF ATLANTA, GEORGIA, ASSIGNOR OF TWO-THIRDS TO ALFRED F. GREEN AND ROBERT P. HORTON, OF SAME PLACE.

TRICYCLE.

SPECIFICATION forming part of Letters Patent No. 523,638, dated July 24, 1894.

Application filed February 8, 1893. Serial No. 461,474. (No model.)

To all whom it may concern:

Be it known that I, EPHRAIM HERRINGTON, a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented certain new and useful Improvements in Tricycles; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to velocipedes, and consists in certain improvements in the construction of the same as hereinafter shown and described, my improvements being more especially adapted for the class known as tricycles.

In the accompanying drawings—Figure 1 represents a plan view of a tricycle provided with my improvements. Fig. 2 is a plan illustrating the propelling mechanism. Fig. 3 is a side view of the improved tricycle. Fig. 4 is a side view, partly in section, of the seat and toggle arms connected therewith, and other details. Fig. 5 illustrates the bearing boxes of the rear axle in transverse section. Fig. 6 illustrates in section the bearing box in the forward wheel of the vehicle. Fig. 7 shows a modification in construction of the bearing boxes. Fig. 8 shows in vertical section one of the travelers which are connected with the motor springs. Fig. 9 illustrates a lever, connected with the shaft of a drum, and connections.

A designates the main frame on which is a platform B. The two rear wheels C of the tricycle are on an axle *a* which is mounted in bearing boxes *b*, secured to the said frame. Underneath the platform B, are placed a series of spiral springs *c*, in position parallel with each other, being separated by the slats *d*. Two guide-rods *c'* are passed through each of the springs *c* longitudinally and are fastened at their extremities to the frame work. Connected with each of the springs *c* at one end, is a plunger-block or traveler *e*, in which is mounted a pulley *e'*, the said traveler having movement between the said guide-rods. As seen in Fig. 2, the travelers *e* are arranged to move alternately in opposite directions when the springs *c* are either expanding or being compressed. A cord e^2 has one end fastened to the frame at *f* and is passed about the pulley *e'* in the nearest traveler *e*; from thence the said cord is passed to and about the pulley in the next traveler and so on until said cord has been passed through the last traveler *e*, from whence it is passed to a drum D, upon which said cord may be wound, the said drum being loose on a shaft *g*, mounted in the rear part of the frame A. The drum D has a ratchet *h* fast on one end of the drum, and at the opposite end is a ratchet *h'* which is fast on said shaft *g*; a pawl *i* serving to prevent backward rotation of the drum on said shaft.

E indicates a lever, the lower end of which is loosely connected with the shaft *g*, near the ratchet wheel *h*, on said shaft. Near the handle end of the lever E, is pivoted a bent finger piece *k*, and rearward therefrom, on said lever, are severally mounted two pulleys *l* and *l'*, said pulleys being in line as shown; and a pivoted bent lever *m* is also mounted on lever E, in line with the said pulleys, the lower end of said lever *m* being raised by a spring *n*. A pawl *n'* is connected with the lever E, near the lower end of the latter, said pawl being in position to be pressed by pivoted lever *m* into connection with the ratchet *h* of the drum D. A cord n^2 is connected with the finger piece *k*, and passed under the pulley *l*, over the pulley *l'* and connected with the pivoted, bent lever *m*.

As will be seen, the lever E is located near the seat F, and when the operator grasps the handle of said lever, pressing the finger piece *k*, the cord n^2 is drawn so as to actuate the pivoted lever *m*, and the latter presses down the pawl *n'* into connection with the ratchet *h* of the drum D. Thus the operator, by successive movements of the lever E, may rotate the shaft *g* and wind the cord e^2 on the drum D and thus compress the springs *c*, the subsequent expansion of which draws the cord e^2 from the drum D and causes the shaft *g* to rotate. The rotary movement of the shaft *g* is communicated to the axle *a*, through the following described gearing. Loose on shaft *g*

is a gear-wheel m' which is prevented from rearward rotation by a pawl n^3 which engages a ratchet wheel o which is fast on said shaft. The gear-wheel m' connects with a pinion r, on a shaft r', mounted in the frame-work, and on the shaft r' is a gear wheel r^2 which engages a gear wheel r^3 on the axle a, of the carrying wheels C.

The propulsion of the vehicle may be assisted by the operator sitting in the seat F which is mounted on two spring-arms or standards G, the lower ends of which are loosely connected with the shaft g, and are constructed to straddle two ratchet wheels o' on said shaft, two pawls o^2, connected with arms G, being in position to connect with the ratchet wheels o'. The toggles I connect the seat F with the platform B, and pivotally connected with said toggles is a bent arm or connecting bar p which extends forward between the pedals p' which are pivotally mounted on lugs fastened to the platform B.

J indicates a lever in position forward of the seat F, and having at its lower end a short arm p^2 extending rearward. Near the elbow x formed by the arm p^2, the latter is pivoted to the forward ends of the pedals p' and also to the connecting bar p, and the arm p^2, near its rear end is pivotally connected with the lugs which carry the pedals.

The operator places his feet on the pedals p' and with his heels bears down on the rear ends of the pedals and at the same time pulls back the lever J, the seat being thus raised somewhat by the action of the toggles I, and the pawls o^2 being also raised on the ratchet wheels o', and connecting therewith; he then with his feet presses down the forward ends of the pedals and moves the lever J forward, by which action the seat is depressed and the pawls o^2, engaging the ratchet wheels o' on shaft g, rotate said shaft or assist in such rotation.

The forward wheel H of the tricycle is mounted in a bifurcated standard L, which has a loose connection with an arm or bent standard K which extends from the frame A, the standard L having a stem s, extending through an aperture in the arm K. A short arm s' is fastened to the stem s, and when the vehicle is going directly forward, the arm s' extends directly forward.

To the bent standard K is fastened a cross-bar s^2, in the ends of which are mounted the pulleys s^3. At each side of the platform B is a frame or standard M in which is mounted a shaft s^4, having a crank s^5 on its inner end; and on the shaft s^4 is a chain wheel N which may be connected with the shaft by ratchet and pawl r^4, and is connected by a chain belt O with a chain-wheel N' on the hub of one of the carrying wheels C. On each of the shafts s^4, at its outer end, is a spool or drum s^6 which is loose on the shaft but may be connected therewith by a ratchet and pawl s^7, so that the operator by turning a crank s^5 forward, may impart motion to the chain-wheels N, N', without rotating the spools s^6; but when he turns either of the cranks s backward, the spool s^6 is connected with the shaft by ratchet and pawl s^7 and is rotated with said shaft. The cords t are fastened to the arm s' on the stem of the standard L, and said cords, extending in opposite directions, are passed about the pulleys s^3, on the ends of the cross-bar s^2, to the drums s^6 on the shafts s^4. The cords t are made somewhat elastic by the springs u, connected with them. To the drums s^6, the other cords t' are attached, each of which is passed under a pulley u', which is carried by an arm extending from a standard M, and attached to the upper end of a pivoted lever P, carried by an arm R of said standard. The lower end of each lever P grasps one half of a clutch v, keyed to the axle a, the other half of said clutch being formed on the hub of a carrying wheel C.

When the operator desires to turn the vehicle to the right, he turns the crank s^5, at his right, backward, winding the cord t, connected with the drum, s^6, on his right, and turning the arm s', and the forward wheel H, to the right; the cord t' being also wound on the drum by the same movement, actuates the lever P, and opens the clutch v, when the wheel C becomes loose on the axle and there is no friction in turning the vehicle. After making the turn, the operator turns the crank s^5 forward which unwinds the cord t' from the drum, releasing the lever P, when the clutch v is immediately closed by a spring w on the axle a.

Fig. 5 illustrates in section the bearing boxes b of the rear axle a, which said boxes may be secured to a cross-bar b^2 of the main frame, and in Fig. 6 is shown, in longitudinal section, the hub of the forward wheel H on its axle w', the shell of the hub being indicated by y. The hub of said wheel H contains a bearing box for its axle w', and the bearing box of axle w' and those of axle a are all substantially similar in construction. Each of said bearing boxes is provided with inner end plates y' and outer plates y^2, the latter being fast on the axle. A circle of rollers z are loosely placed against and around the axle, and surrounding the rollers z is a rim z' which is also loose. Around the rim z', and between said rim and the shell y is another circle of loose rollers z^2. Ball bearings z^3 are placed in annular grooves, between the shell y and the end plates y', and similar bearings are provided between the inner end plates y' and the outer end plates y^2.

In Fig. 7 is shown a modification in the construction of the hub, the roller bearings, lengthwise with the axle, being omitted and a loose rim or sleeve 1 being employed which has annular grooves at the ends and ball bearings 2, between the ends of the sleeve and the end plates, and similar bearings 3 between said sleeve and the shell 4.

As will be seen, the spring motor furnishes the main driving power, but additional power

is furnished by using the pedals, the crank-shafts and sprocket wheels, and the weight of the rider by an occasional movement of his body; and such additional force is of considerable utility in going up a steep ascent, &c. The rider, by the use of the lever E, winds the compressing cord on the drum D when going along on a level or a downward incline.

I claim—

1. The combination, with the body of a vehicle, of an axle with carrying wheels, a shaft mounted in rear of said axle, two ratchet wheels on said shaft, two arms, loosely connected with said shaft and forming supports to a seat, pawls connected with said arms and adapted to connect with said ratchet wheels, toggle arms connected with said body and with said seat, pedals, pivotally mounted on said body, a hand lever, pivotally connected with said body and with said pedals, and a connecting rod or bar, pivotally connected with said lever and pedals and also with said toggle arms, substantially as and for the purposes described.

2. The combination, with a frame and a shaft *g* mounted therein, of a drum on said shaft and a ratchet wheel thereon, a hand-lever, loosely connected with said shaft, a spring-pawl, connected with said lever, in position to connect with said ratchet wheel, a pivoted lever connected with said hand-lever, in position to actuate said pawl, two pulleys and a pivoted finger piece, severally connected with said hand-lever, and a cord, so connected and adjusted, that by the operation of the several parts, said drum may be rotated, substantially as set forth and described.

3. The combination with a frame and axle with carrying wheels, of a forward wheel, a standard in which said forward wheel is mounted, said standard being loosely connected with said frame, an arm fastened to the stem of said standard, a cross-bar having pulleys mounted in its extremities, crank-shafts mounted at the opposite sides of said frame, a spool or drum mounted on each of said crank-shafts, a ratchet and pawl to connect said spool with said crank-shaft when the latter is turned in one direction, pivoted levers supported at the sides of said frame, spring clutches, at the hubs of two carrying wheels, with which said pivoted levers are adapted to connect, cords, connected with the arm on the stem of said standard and with said spools, and other cords connected with said spools and with said pivoted levers, substantantially as set forth and described.

4. The combination, with a frame and an axle with carrying wheels, of two crank-shafts, one being mounted at each side of said frame, chain wheels on said crank-shafts and ratchets and pawls to connect said wheels with said shafts, chain wheels on said axle and bands connecting them with the chain-wheels on the crank-shafts, clutches on said axle, at the hubs of the carrying wheels, and pivoted levers adapted to open or close said clutches, substantially as set forth and described.

5. The combination, with the body of a vehicle and an axle with carrying wheels, of a seat and toggle arms I connected with said seat and with said body, connecting bar *p*, pedals *p'*, pivotally mounted on said body, lever J, pivotally connected with said body and said pedals and connecting bar, and mechanism connected with said seat and with said axle for rotating the latter, substantially as set forth and described.

6. The combination with the standard of front wheel H, of an arm *s'*, fastened to the stem of said standard, a cross-bar s^2, pulleys s^3, carried by said cross-bar, cords *t*, provided with springs *u*, and passed about said pulleys, and mechanism for drawing said cords, substantially as set forth and described.

In testimony whereof I affix my signature in presence of two witnesses.

EPHRAIM HERRINGTON.

Witnesses:
J. W. BREWER,
S. L. BALDWIN.