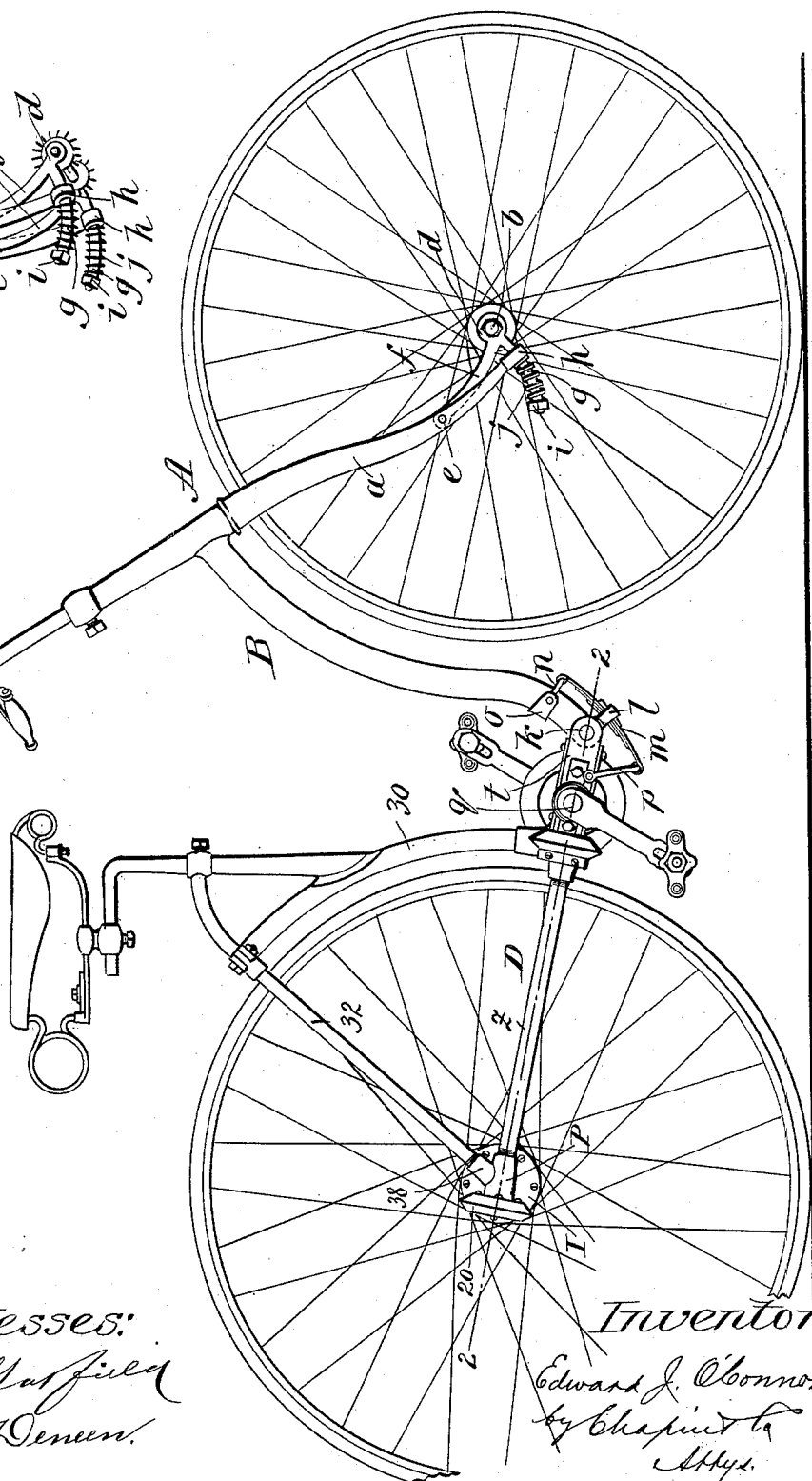
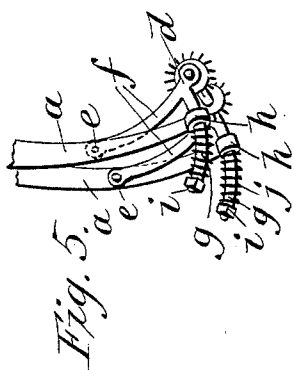


2 Sheets—Sheet 1.

No. 468,823.

Patented Feb. 16, 1892.



Witnesses:

J. W. Gasfield
G. F. Zeneen.

Inventor,

Edward J. Connon
by Charles G.
Atty.

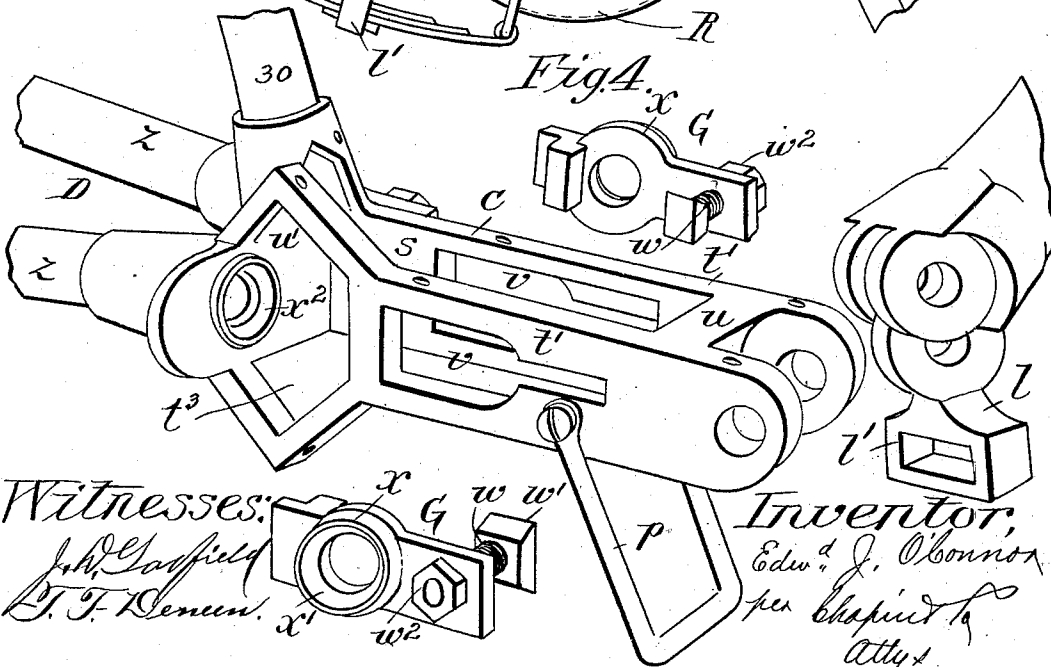
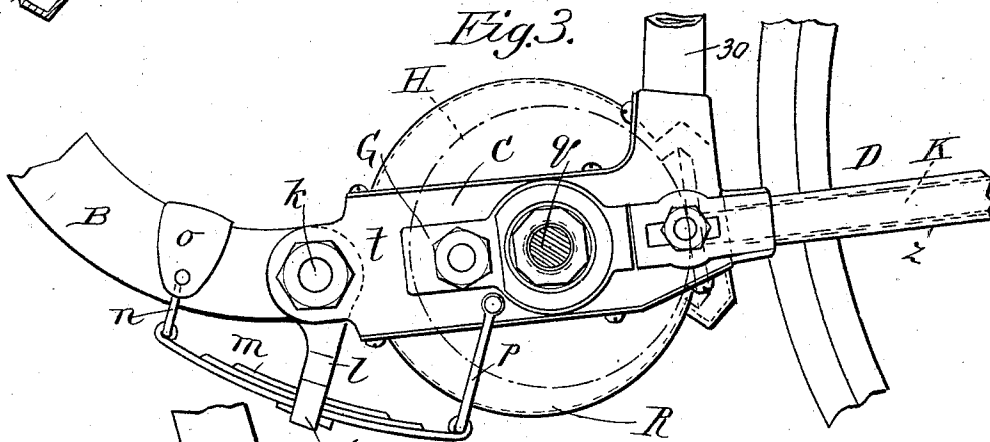
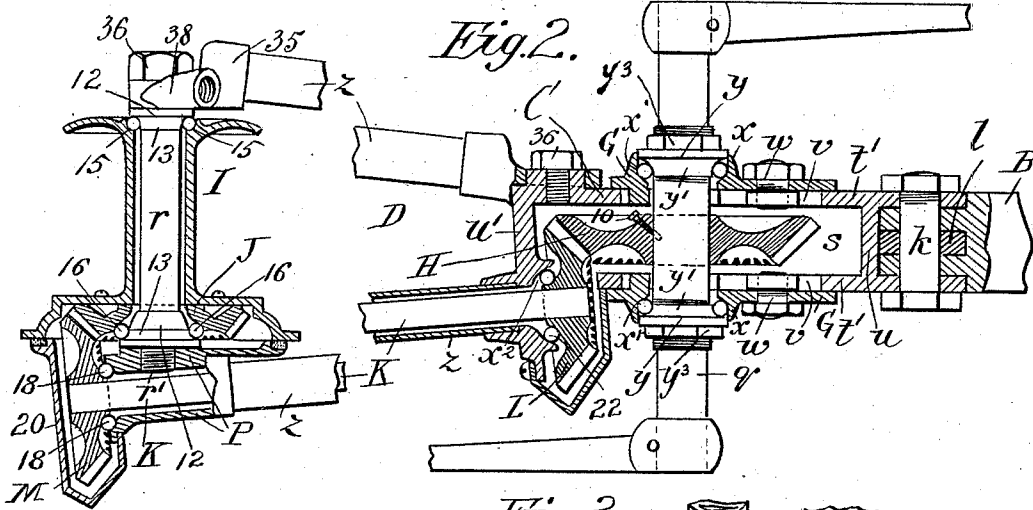
(No Model.)

E. J. O'CONNOR.
VELOCIPEDÉ.

2 Sheets—Sheet 2.

No. 468,823.

Patented Feb. 16, 1892.



UNITED STATES PATENT OFFICE.

EDWARD J. O'CONNOR, OF SPRINGFIELD, MASSACHUSETTS.

VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 468,823, dated February 16, 1892.

Application filed June 3, 1891. Serial No. 394,985. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. O'CONNOR, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Velocipedes, of which the following is a specification.

This invention relates to improvements in velocipedes, especially Safety bicycles, the object being to improve the construction, especially with respect to spring-bearings between the front fork and the forward wheel, to the driving mechanism and appliances for action in connection with the driving mechanism, and to a spring-frame.

The invention consists in the construction and combination of parts, all substantially as will hereinafter more fully appear and be set forth in the claims.

Referring to the accompanying drawings, Figure 1 is a side elevation of a Safety bicycle, showing certain of the present improvements embodied therein. Fig. 2 is a horizontal section, on a larger scale, of the driving mechanism, taken on the line 2 2, Fig. 1. Fig. 3 is a side elevation of a part of the driving mechanism as seen at the opposite side from that of Fig. 1. Fig. 4 is a perspective illustration comprising views of different parts embodied in the machine about the pedal and driving mechanism and which will be hereinafter more particularly referred to. Fig. 5 shows the spring-fork detached from the machine.

In the drawings, A represents the head of the machine, which is to be constructed in any usual or improved manner, the same comprising the forked legs *a a*.

b represents the axle for forming the bearing for the front wheel.

The novel engagement between the front fork and the front-wheel axle is constituted thus: On each end of the axle there is an angular or Y-formed lever, which at the portion *d* adjacent or slightly extended from the junction of the members *f* and *g* is engaged with and has its bearing upon the axle. The extremity of each fork-leg is back of the axle, and the member *f* of each of said angular levers extends upwardly and rearwardly and has a pivotal connection with one of the fork-legs somewhat above its end. The fork-leg

end has an eye or aperture at *h*, through and beyond which the rearwardly and more or less downwardly extended arm or member *g* passes, and the arm *g* has a stop *i* at its end, between which and the fork-leg end the spring *j* is applied. The weight on the frame or head causing the fork-legs to exert a downward force at the pivotal connection thereof with the angular lever member *f* insures the swinging of the lever until the spring is compressed in a degree equal to the force applied, and it will be understood that the bearing between the front wheel and the front portion of the machine-frame is such a one as will render insignificant the jolting and vibration which may be directly imparted at the front wheel. It will be noticed that the member *g* of each of the angular levers is of arc form, as generated from the point *e* on the member *f* of pivotal connection with the front fork, so that there will be no bind between the arm *g* and the fork-eye *h*. This form of spring-fork connection at the head of the machine, while highly efficient for the purposes for which it is designed, may be of a comparatively light and very inexpensive construction.

For the purposes of clearness of illustration in the drawings, Figs. 1 and 5, the members *f* of each of the angular levers of the front-fork bearing is shown as having a considerable fore-and-aft rake or inclination greater than that of the fork; but in practice such a great inclination is not necessary, and the structure in design will be neater and more compact and yet as efficient when the members *f f* are almost parallel with the fork-legs.

B represents the backbone of the machine-frame, and the rear of the backbone proper is pivoted or jointed to the portion of the machine-frame forward of the rear-wheel fork D, as indicated at *k*. There is radially of the pivotal line *k* a downwardly-extended lug *l*, which is hung on the pivot pin or bolt applied at *k* for effecting the joint. Said lug has a slight swinging motion in the vertical plane longitudinally of the machine, and the extremity thereof is in the form of a yoke *l'*, (see Fig. 4,) through which the intermediate portion of the leaf or plate spring *m* is held and supported. The forward end of the said

spring is held under stress, being connected to a link or clevis *n*, which is hung upon the clip *o*, secured on the rear portion of the backbone. The rear end of the said spring *n* is also held under stress by being connected to the clevis *p*, which is hung on the forging or part *C* of the machine-frame just at the rear of the joint *k*. The weight on the frame either at the fore or after part thereof, which would tend to cause the same to collapse in view of the joint *k*, is resisted in an easy and gradual manner by the spring appliance just described, and the single spring applied in the manner described is susceptible of insuring a distribution of the stress or weight which is brought thereon through the frame uniformly throughout a considerable portion of the length of the spring.

While the features of construction above described are applicable to velocipedes which may be driven through any of the usual or approved forms of mechanism, I have illustrated in the drawings bevel-gear and shaft connections between the pedal-crank shaft *q* and the axle *r* of the rear wheel, the particular arrangement of which for a particular purpose, and also constructions most particularly illustrated in Sheet 2 of the drawings, which are designed with respect to this particular gearing, constitute inventions for improvement, and they will be now described. The part *C* of the frame next to the rear of the backbone is jointed thereto by the same bolt *k* which supports the lug *l* for the spring, and the said part *C*, which is intended to be a forging properly finished, comprises parallel and separated cheek pieces or bars *t' t'*, with the opening *s* between said parts *t'*, which latter are, however, at their ends united by the cross-webs *u* and *u'*. The said part or forging *C* has opposing longitudinal ways *v v* formed horizontally through the cheek-pieces *t' t'*, which ways, as shown, are wider at their rear sections, and the pedal-crank shaft *q* passes through them, the same being extended outwardly at either side of said casting. The said shaft *q* is supported upon the slides *G G*, which fit and also lie outside of the said ways *v v*, said shaft-supporting slides being movable forward and rearward and are held in confinement by the screw-bolts *w*, which have at one end a clamp-block *w'* and at the other a confining-nut *w''*. Each of the slides for the shaft *q* is provided with a boss *x*, having a flaring and internal peripheral ball-seat *x'*, with which for the confinement of the balls co-operate the screw-collars *y y*, having the peripheral and curved or conical bearing-surfaces *y'*, the said internally-threaded collars *y* screwing onto properly-threaded portions of the shaft *q*, as clearly indicated in Fig. 2. The said collars are held in place by the check-nuts *y''*.

H represents a bevel gear-wheel, which is secured on the middle of the crank-shaft by the screw 10, passing obliquely through the hub of the gear-wheel and into the shaft, and,

as plainly seen, the said gear-wheel lies between the cheek-pieces *t' t'*.

J represents a gear-wheel, which is secured in the hub *I* of the rear wheel, the said gear *J* being in a plane parallel with and but a short distance offset from the plane of the gear *H*. The axle *r* for the rear wheel is fixed against rotation and toward its ends it is provided with the fixed collars or enlargements 12 12, with the peripheral and conical bearing-surfaces for the balls of the rear-wheel bearing, which collar-bearing surfaces at one end of the axle *r* coact with those 15 at one end of the hub *I*, while the axle-bearing surfaces 13 at the other end coact with the inclined and peripheral bearing-surface 16, internally formed upon the said gear *J*, which is secured to or is in substance as one with the said hub.

K represents a shaft, which at its forward end is approached and supported in proximity to the rear toothed rim of the said gear *H* and carries fixed thereon a bevel gear-wheel *L*, which meshes with the one *H* at the rear of the crank-shaft, and the said shaft *K* is extended to and beyond the end of the rear axle *r* and carries at its rear end, which is opposite the rear portion of the toothed rim of the gear *J*, fixed thereon, the bevel gear-wheel *M*, which meshes with the one *j* which is set upon the rear-wheel hub *I* a considerable distance inside of the extreme outer end *r'* of the axle *r*. The forward driving of the crank-shaft *q* thus forwardly drives the rear wheel through its hub.

I am aware that it is not a novelty to apply a bevel-gear on the crank-shaft and another on the rear-wheel hub and to apply a shaft with bevel-gears to engage with the crank-shaft gear and the rear-wheel gear; but heretofore, so far as I am aware, the rear-wheel bevel-gear has been applied about coincident with the outer end of the axle and the gear on the connecting-shaft has engaged the rear-wheel gear forward of the axis instead of at the rear, and the line of the connecting-shaft has therefore necessarily been more inclined to the common longitudinal line of the machine and more widely or outwardly distended and cumbersome opposite the rear bearing than here illustrated, for it will be seen that under the construction shown in Fig. 2 the connecting-shaft *K* may be inclosed in one of the rear-fork legs *z*, which may be tubular and the shaft extend closely past the end of the rear-wheel axle *r* to have its gear *M* inwardly disposed to mesh with the gear *J*. There is screwed upon the extremity of the rear axle a tubular bracket or fixed part *P*, which forms the support for the rear portion of the connecting-shaft *K* and the gear thereon, and to which part the tubular fork-leg *z* is connected at its rear end. Between the rear orifice of the said tubular bracket *P* and the adjacent end portion of the hub of the gear *M*, which parts are suitably peripherally formed, the hardened balls 18 are dis-

posed. The hub I at its end is flanged or cupped for the disposition and confinement of the gear J, and the bracket P is formed to partially inclose the gear in said cupped hub, and a casing 20 is supported on the said bracket P for inclosing the bevel-gear M.

The rearward cross-web w' of the part or forging t constitutes suitable supports or brackets for the rear-fork legs $z z$, and said part w' , as indicated at x^2 , is provided with an inclined and peripheral ball-bearing surface, between which and the properly-formed portion of the hub of gear L the hardened balls 22 are applied.

Under the construction set forth the bevel-gear H on the crank-shaft may be removed and substituted by one of greater or less diameter, the position of the crank-shaft being readily changed to accord with the difference in diameter by loosening the confinement at the bolts w and forcing the slides either forward or backward, as the case may be.

R, Fig. 3, indicates a shell or casing for inclosing the gear-wheel H, the same being supported on the forging or part C.

The rear-fork leg z opposite the one inclosing the shaft K is supported at its forward end on the forging C and the leg by the rear bracket-lug 35 at its rear end is firmly held upon the rear axle r , the bolts 36 36 serving as the means for a detachable confinement of the fork-leg, which is necessary to permit the assemblage of the parts when constructed and arranged as described. Both the bracket P and the bracket-lug 35 at the opposite end of the axle are provided each with an upwardly and forwardly extended boss axially bored and tapped, each lug receiving the lower end of one of the oblique braces 32, the upper end of which is by a suitable form of joint confined to the upper end or portion of the saddle-supporting post or upright 30.

What I claim is—

1. In a velocipede, in combination, the wheel-axle and the fork extended adjacent the axle, and a lever having angularly-extended arms or members and mounted for bearing at or near the junction thereof on the wheel-axle, one of said members having a pivotal connection with the fork-leg at a suitable distance from its end and the other extended in proximity to and beyond the extremity of the fork-leg and having thereon a stop and a spring between the stop and the fork-leg extremity, for the purpose set forth.

2. In a velocipede, in combination, the wheel-axle and the front-fork legs terminating at the rear of the axle and each provided with the eye h and a pair of angular levers, each comprising the members f and g , mounted for bearing at or near the junction on the axle and each member f extended upwardly and rearwardly and pivotally connected to a fork-leg above its end, and each member g , being of arc form, concentric with said pivotal connection at the fork-leg and extended through the fork-leg eye and having the stop i and

the spring g , substantially as described and shown.

3. In a velocipede, in combination, a frame intermediately pivotally jointed and a lug extended from the pivot, a spring intermediately thereof supported on said lug, and links uniting the ends of said spring with portions of the frame which are forward and to the rear of the joint, for the purpose set forth.

4. In a velocipede, in combination, a frame intermediately and pivotally jointed and a lug hung upon the joint-pivot, and at its outer portion of yoke form, a plate or leaf spring intermediately thereof embraced by and supported on said lug-yoke, and links or clevises uniting the ends of said spring with portions of the frame which are forward and to the rear of the joint, substantially as described, for the purpose set forth.

5. In a velocipede, the combination, with an intermediate part of the frame having opposite cheek-pieces $t' t'$ with longitudinal ways therein, of slides supported on said cheek-pieces and movable in said ways and having confining-bolts therefor, said slides having the opposing openings through them with the peripheral ball-bearing surfaces x' and the crank-shaft passed through said slides and having the screw-collars $y y$ with the peripheral bearing-surfaces y' , and the balls, substantially as and for the purposes described.

6. In a velocipede, the combination, with the crank-shaft having a bevel-gear thereon and the hub of the rear wheel having a bevel-gear fixed thereon within the end of the rear axle, of the connecting-shaft K, suitably supported and having at its forward end a gear-wheel which meshes with the crank-shaft gear and by its rearward portion extended next to and rearwardly beyond the end of the rear axle and having a gear-wheel thereon which meshes with the rear-wheel gear, for the purpose set forth.

7. In a velocipede, in combination, the rear-wheel axle having the enlargement with a peripheral bearing-surface 13, the wheel-hub surrounding the axle and having the gear J fixed to move as one therewith, the hub of said gear being internally formed to constitute a ball-bearing surface opposite the surface 13, the balls, the driving-shaft, and a shaft geared thereto and by its rear portion supported by the rear-wheel axle and having a gear geared to said hub-gear, as set forth.

8. In a velocipede, in combination, the rear axle with the enlargement and peripheral bearing-surface and the hub with the gear J and intermediate balls 16, the tubular bracket P, supported at the extremity of the axle, which is extended outwardly beyond said gear and having its rear orifice formed to constitute a ball-bearing surface, the shaft K, having a gear-wheel thereon with a portion of its hub opposite the orifice of the bracket formed to constitute a ball-bearing surface, and the balls 18, substantially as described.

9. In a velocipede, the combination, with an intermediate part of the machine-frame having a transverse wall or part, as u' , apertured and provided with a peripheral ball-bearing surface, as x , of the crank-shaft mounted on said intermediate part of the frame and provided with a gear, a gear on the rear wheel, a shaft having a gear on the rear thereof engaging the rear-wheel gear, said shaft projected forwardly through the aperture in the part u' and having a gear thereon which engages the crank-shaft gear, and the balls 22, substantially as described.

10. In a velocipede, the combination, with the crank-shaft having a bevel-gear thereon, the rear axle, and the hub of the rear wheel having a bevel gear-wheel fixed thereon within the end of the axle, of a bracket screwed and supported upon the end of the rear axle, the connecting-shaft K by its rear portion supported on said bracket and extended rearwardly past the axle and provided with the bevel-gear, and said shaft at its forward end

suitably supported and having the bevel gear-wheel to mesh with the crank-shaft gear, substantially as described.

11. In a velocipede, in combination with the part C, having opposing and separated cheek-pieces and the crank-axle passed through and having a support thereon, said part C having at its rear end the transverse portion u' , apertured as described, the rear-wheel axle having the bracket P on its end and the wheel-hub surrounding the axle and having the gear J inwardly from the end of the axle, the tubular fork z , supported on and extending between said bracket and the part u' , and the connecting-shaft passed through said tubular fork and said bracket P and the part u' and having the gears L and M, arranged substantially as described, for the purposes set forth.

EDWARD J. O'CONNOR.

Witnesses:

WM. S. BELLOWS,
J. D. GARFIELD.