

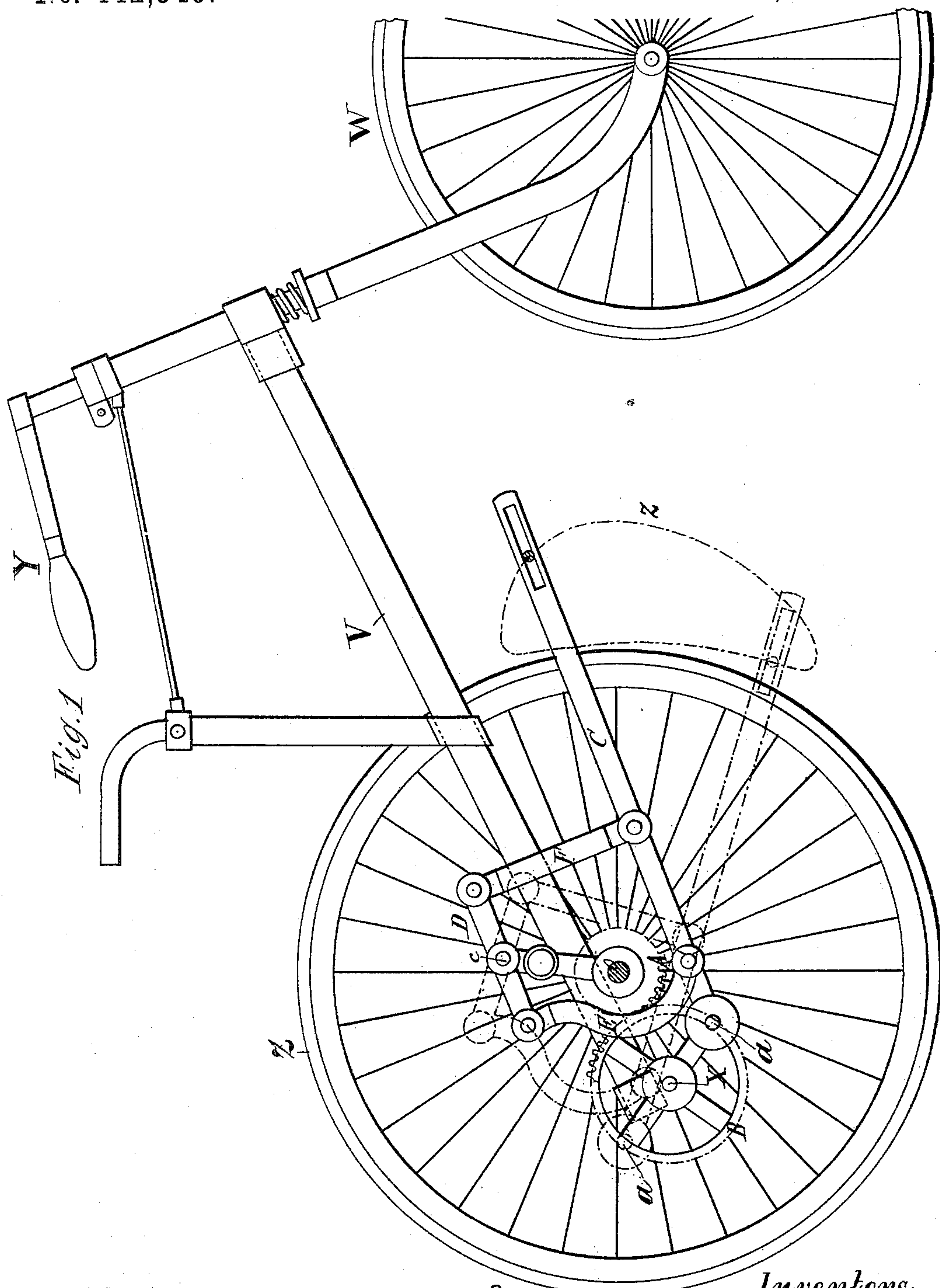
(No Model.)

2 Sheets—Sheet 1.

E. WORMS & A. S. ZWIERZCHOWSKI.  
VELOCIPÈDE.

No. 442,345.

Patented Dec. 9, 1890.



Witnesses:  
*J. B. Capling*  
*E. W. Stuart*

Inventors:  
*Eugene Worms,*  
*Alexandre Sigismund Zwierzowski,*  
by: *Henry Comstock*

(No Model.)

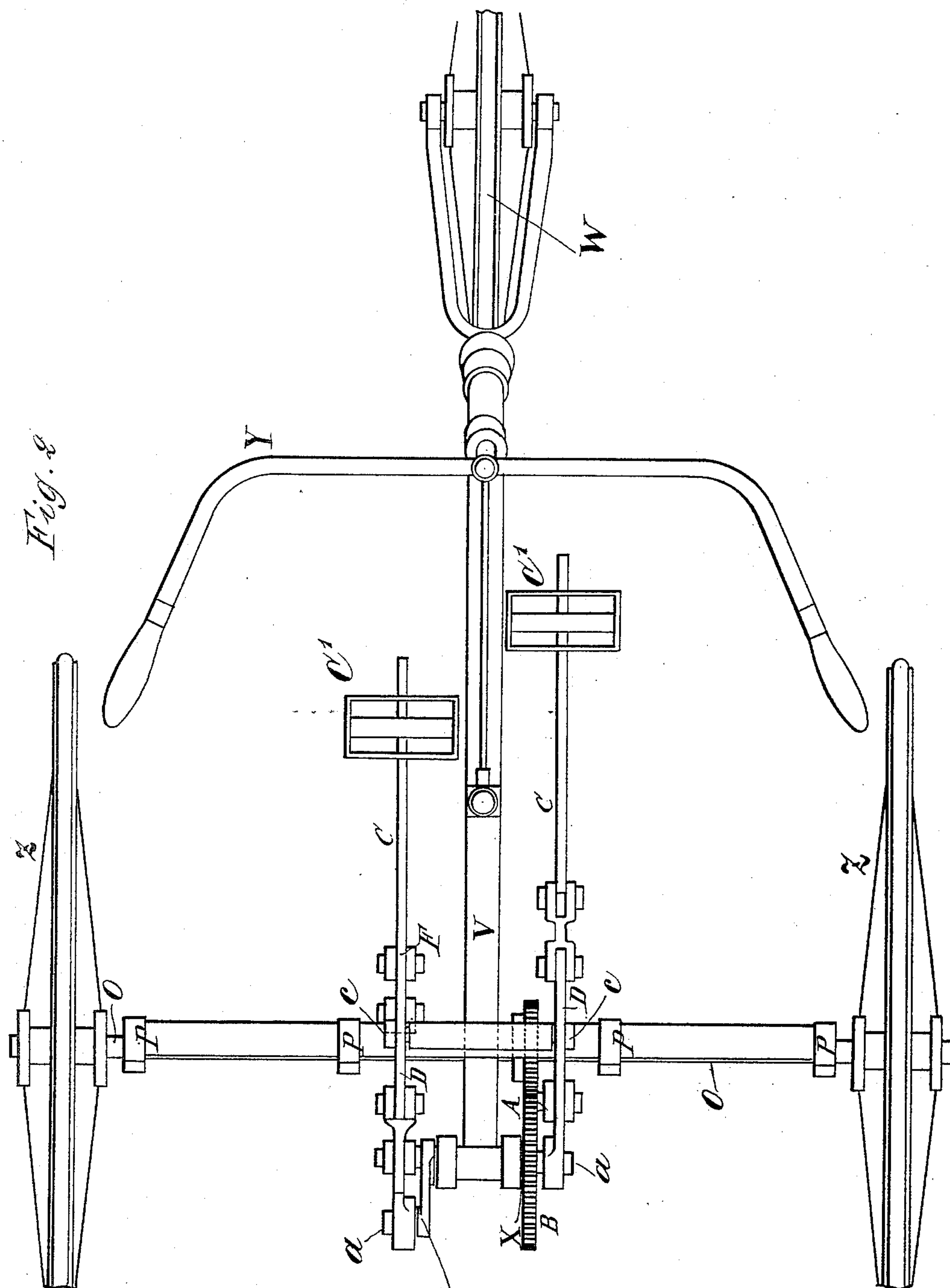
2 Sheets—Sheet 2.

E. WORMS & A. S. ZWIERZCHOWSKI.

VELOCIPÈDE.

No. 442,345.

Patented Dec. 9, 1890.



Witnesses:

*J. B. Sappington*  
*E. W. Stewart*

Eugene Worms.

Inventors:

Alexandre Sigismund Zwierzchowski.

by *Henry Cornett*



# UNITED STATES PATENT OFFICE.

EUGÈNE WORMS AND ALEXANDRE SIGISMOND ZWIERZCHOWSKI, OF  
PARIS, FRANCE.

## VELOCIPÈDE.

SPECIFICATION forming part of Letters Patent No. 442,345, dated December 9, 1890.

Application filed September 29, 1890. Serial No. 366,443. (No model.) Patented in France August 4, 1890, and in England August 12, 1890, No. 12,618.

*To all whom it may concern:*

Be it known that we, EUGÈNE WORMS and ALEXANDRE SIGISMOND ZWIERZCHOWSKI, both citizens of the French Republic, and residents of Paris, France, have jointly invented certain Improvements in Driving-Gear for Tricycles and other Velocipedes, (for which patents have been granted in France, dated August 4, 1890, and in England, No. 12,618, dated August 12, 1890,) of which the following is a specification.

Our invention relates to that class of velocipedes in which rotary motion is imparted to the driving-wheels through the medium of treadles; and it has for its object a multiplying-gear in connection with the treadles, and to give to the pedals on the treadles a movement in a path having the form of a long ovoidal curve, said movement approximating to that of the foot in walking.

Our invention will be fully described hereinafter, and its novel features carefully defined in the claims.

In the accompanying drawings, we have shown our improvements embodied in a tricycle, of which—

Figure 1 is a side elevation with the near driving-wheel removed, and Fig. 2 is a plan.

V represents the usual frame-work of such a vehicle; W, the steering-wheel; Y, the steering-handle, and Z the driving-wheels fixed on the axle O. The axle may have ball-bearings in the frame at P.

On the axle O is fixed a toothed pinion A, which gears with a driving spur-wheel B on a crank-shaft X, mounted in the frame V of the vehicle. There are two crank-pins *a*, one on the wheel B and the other on a crank *b* on the opposite end of the shaft X. The cranks are or may be set at right angles on the shaft, and to each is coupled a treadle-driving mechanism. As these mechanisms are alike, and the same reference-letters are used in both, it will only be necessary to minutely describe one. Premising, however, that to avoid confusion only one of these mechanisms is shown in Fig. 1, it being represented in full lines in one position and in dotted lines in another position.

C is the treadle, and C' the pedal thereon to receive the foot. The treadle is coupled to the crank-pin *a*, and is suspended from a rocking lever D by two links E and F, which are coupled at their upper ends to the lever D on opposite sides of its fulcrum *c*. This fulcrum is on a part of the framework directly over the axle O, by preference. When the treadles are operated by the feet of the rider, the lever D rocks on its fulcrum. The rear end of the treadle, being coupled to the crank-pin, moves in a circular path, and the pedal C' moves in a long ovoidal path, indicated in Fig. 1 by the dotted line *z*. This gives to the foot of the rider a movement closely approximating to that of walking, thus departing on the one hand from the circular movement of the crank, and on the other hand from the up-and-down movement of the ordinary treadle.

The treadle may be furnished with any kind of rocking pedal C', or the foot may rest directly on the treadle C itself.

By our construction of suspended treadles coupled directly to the cranks we obtain all the advantages of a multiplying-gear without the chains and sprocket-wheels. We also obtain all the advantages due to the treadle motion, and in addition thereto a pedal movement similar to that of the foot in walking.

The velocipede may be driven with one crank and suspended treadle; but for reasons familiar to those skilled in the art we prefer to employ two, as in all vehicles of this character.

So far as concerns the suspended swinging treadle coupled directly to the crank on the crank-shaft it is immaterial what kind of gearing is employed to connect the crank-shaft with the axle. Any known form of gearing may be employed. We prefer, however, to employ ordinary toothed gearing, as described.

The link E is bent, as shown in the drawings, merely to avoid the axle.

Having thus described our invention, we claim—

1. In a velocipede, the combination, with the crank to be rotated, of the treadle coupled to said crank, the rocking lever, and the links

which couple said lever on opposite sides of its fulcrum to the said treadle and suspend the same, whereby the pedal end of said treadle is caused to move in an ovoidal path when the  
5 crank is rotated, substantially as set forth.

2. In a velocipede, the combination, with the axle O, having on it the driving-wheels and the pinion A, of the crank-shaft X, the spur-wheel B thereon, gearing with the pinion A, the  
10 treadles C, coupled to the respective cranks on shaft X, the rocking levers D, and the

links E F, which connect the treadles, respectively, with the rocking levers, substantially as set forth.

In witness whereof we have hereunto signed 15  
our names in the presence of two subscribing witnesses.

EUGÈNE WORMS.

ALEXANDRE SIGISMOND ZWIERZCHOWSKI.

Witnesses:

R. J. PRESTON,

MICHEL COQUART.