

R. STEEL.  
Velocipede.

No. 211,116.

Patented Jan. 7, 1879.

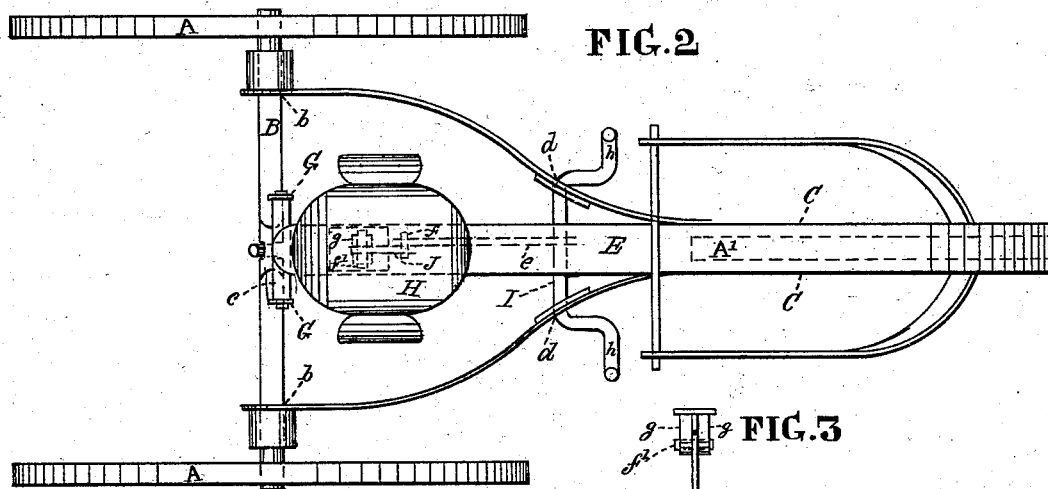
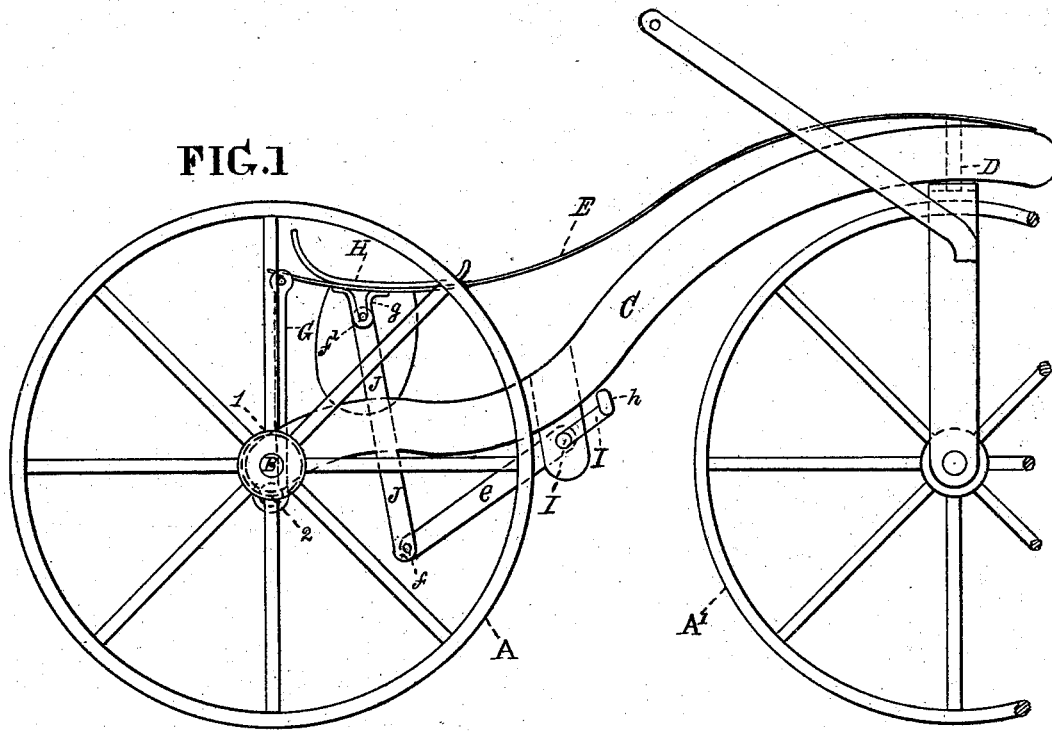


FIG. 2

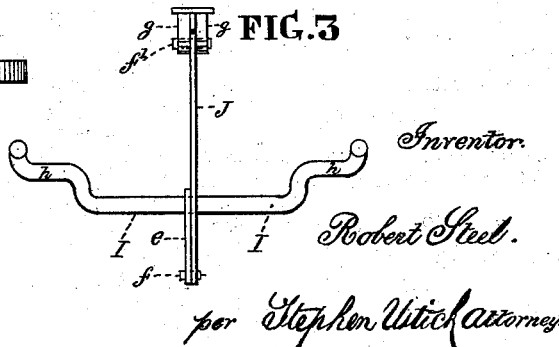


FIG. 3

Witnesses.

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per Stephen Utich attorney.

# UNITED STATES PATENT OFFICE.

ROBERT STEEL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HENRY B. DUFFEE AND T. HOOD STEVENS, OF SAME PLACE.

## IMPROVEMENT IN VELOCIPEDES.

Specification forming part of Letters Patent No. 211,116, dated January 7, 1879; application filed October 9, 1878.

*To all whom it may concern:*

Be it known that I, ROBERT STEEL, of the city and county of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in Velocipedes, of which the following is a specification:

This invention is an improvement on my application for Letters Patent for a like invention filed May 18, 1878, and in which there is a combination of a spring-bar (provided with a saddle) with the supporting-frame of the velocipede, and with a crank-shaft of the traction-wheels, the latter connection being made by means of a vertical connecting-rod, whereby the crank, by the weight of the rider, is turned one-half around, the other semi-revolution of the crank being effected by the upward force of the spring in regaining its position as the weight of the rider is transferred from the saddle to the foot-rests.

By a practical test of a full-size velocipede it was demonstrated that the force of the spring-bar in regaining its position was sufficient to carry the crank through the last half of its revolution when the velocipede is running on level ground or on a moderate up grade, but not when running up a steep grade.

To remedy this defect is the object of the present invention; and the invention consists of an auxiliary crank-shaft and vertical connecting-rod, in combination with the supporting-frame of the velocipede and the lower side of the spring-bar, the crank-shaft having arms, which act as foot-rests, so that by the weight of the rider in the upward movement of the crank-shaft being transferred to the foot-rests of this auxiliary crank-shaft, whereby the spring-bar is relieved of the downward pressure, the force exerted upon this crank-shaft is exerted upon the spring-bar, in addition to its force in regaining its upward position, and these two combined forces carry the main crank over the last half of its revolution, and, acting alternately with the force exerted by the weight of the rider, give a continuous and regular movement to the main crank-shaft, as hereinafter fully described.

In the accompanying drawings, Figure 1 is a side elevation of a velocipede provided with my improvement. Fig. 2 is a plan view of the

same. Fig. 3 is a rear view of the auxiliary crank-shaft I and the connecting-rod J, the upper end of the rod being in connection with the block *g*.

Like letters of reference in all the figures indicate the same parts.

A A are the traction-wheels of my improved velocipede, and A' the swivel-wheel. B is the axle of the traction-wheels. C is the supporting-frame, composed of two side bars, which are spread apart at their rear ends, which have bearings at *b b* for the axle B. The front ends have a block between, to which they are firmly riveted, the said block having a vertical opening to form a suitable bearing for the swivel D, the bifurcated end being provided with the swivel-wheel A', in the usual manner. E is a spring-bar, which is permanently connected at its front end with the supporting-frame C, and at its rear end with the upper ends of the prongs of the upright connecting-rod G, by means of the cross-bar *e*, which has pivots on its ends, which turn in bearings of said prongs. The lower end of the connecting-rod G has a joint-connection with the crank of the shaft B. The spring-bar E has a saddle, H, for the rider.

So far the parts described are such as shown in my application above referred to.

My present invention consists of the auxiliary crank-shaft I, having journals *d* and a rigid arm, *e*, and the upright connecting-rod J, the journals of the shaft being supported by suitable bearings of the supporting-frame C, and the connecting-rod having a joint-connection at its lower end with the pin *f*, and at its upper end with the lower side of the spring-bar E beneath the saddle H by the block *g* and joint-pin *f'*, as seen in Fig. 1.

The operation is as follows: The rider being seated on the saddle H, with his feet resting on arms *h h* of the auxiliary crank-shaft I, as the crank of the shaft B passes the center at the upper point, 1, his feet are caused to have a slight pressure upon the crank-arms *h h*, so as to merely keep them in place, and the weight of the body is brought to bear with its full force upon the spring-bar E, so as to turn the crank one-half around, when it reaches the point 2, and the spring-bar is bent downward, as seen in Fig. 1. At the point 2 the crank begins to

ascend by the momentum given to it by the forward movement of the velocipede, and then the rider transfers his weight from the saddle H by the upward movements of his body and the pressure of his whole force upon the crank-arms of the auxiliary shaft I, whereby the arm *e* of the shaft gives an upward movement to the connecting-rod J, thus bearing the spring-shaft E upward, which force, in connection with that exerted by the spring-bar in regaining its upward position, carries the crank through the latter half of its revolution, with equal force to that exerted in the first half of its revolution, and so on successively through all the

revolutions of the crank of the shaft B, whereby a regular movement of the velocipede is maintained.

I claim as my invention—

The combination of the crank-shaft I, having an arm, *e*, and the connecting-rod J, with the supporting-frame C and the spring-bar E, for giving an increased upward force to the spring-bar, substantially in the manner and for the purpose set forth.

ROBERT STEEL.

Witnesses:

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