

No. 658,717.

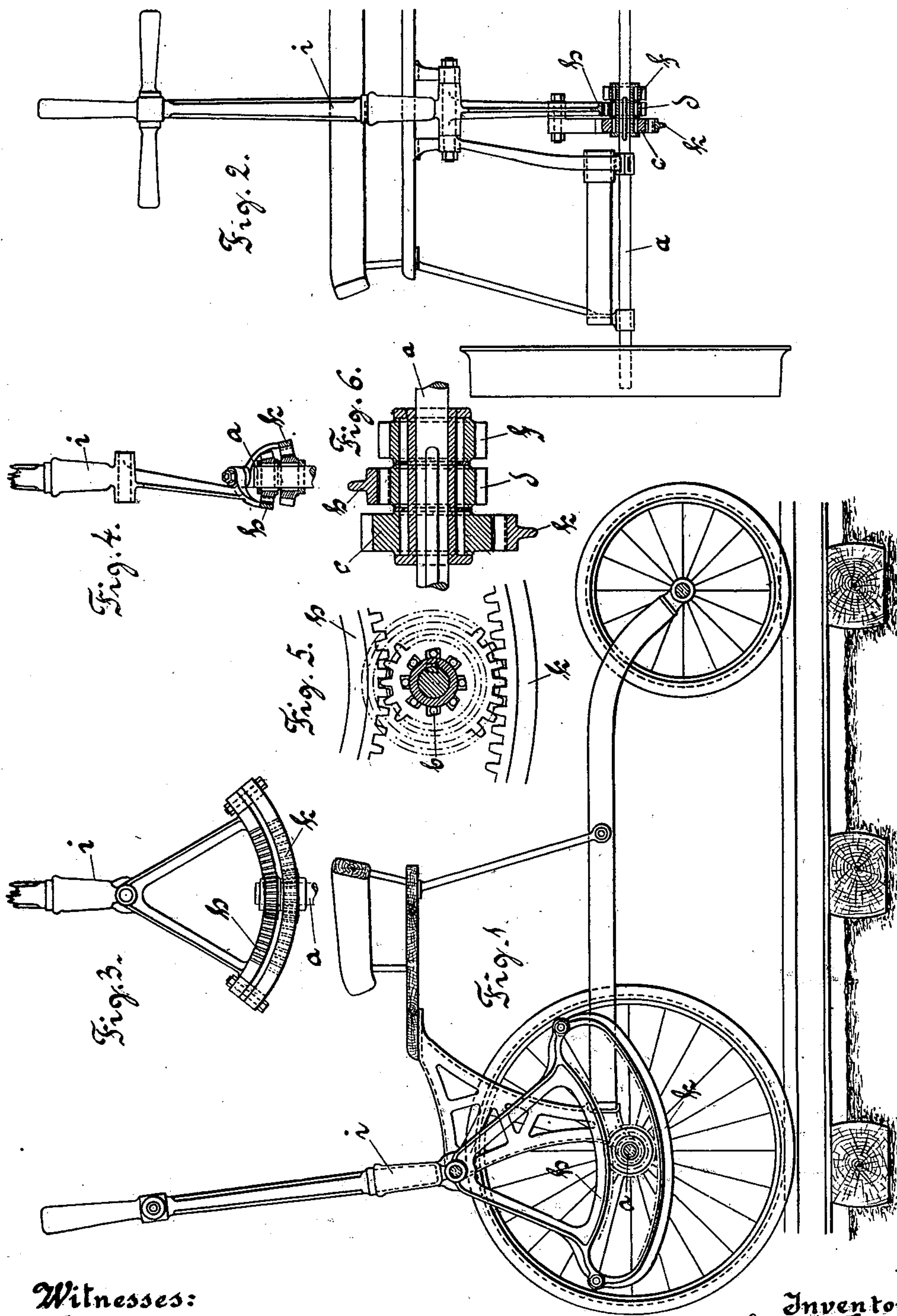
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G. TJERNELD.

MECHANISM FOR PROPELLING RAILWAY VELOCIPEDES, BOATS, &c.

(Application filed Dec. 28, 1897.)

(No Model.)



Witnesses:

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UNITED STATES PATENT OFFICE.

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MECHANISM FOR PROPELLING RAILWAY-VELOCIPEDES, BOATS, &c.

SPECIFICATION forming part of Letters Patent No. 658,717, dated September 25, 1900.

Application filed December 28, 1897. Serial No. 663,830. (No model.)

To all whom it may concern:

Be it known that I, GUNNAR TJERNELD, a subject of the King of Sweden and Norway, and a resident of Carlstad, Sweden, have invented a new and useful Improvement in Mechanism for Propelling Railway-Velocipedes, Boats, and other Vehicles, of which the following is a specification, reference being had to the accompanying drawings, forming a part of the same.

The object of my invention is to provide an improved mechanism for the propelling of railway-velocipedes, boats, and other hand-propelled vehicles.

The invention consists, briefly, in having on one end of an ordinary oscillating hand-lever two gear-wheel sectors or racks, which on opposite sides of the driving-shaft ordinarily mesh each with one of two different pinions connected with the shaft by ratchets. The diameter of the pinions may be made to correspond to the radius of the two gear-wheel sectors in question in such a manner as to obtain the same gearing when the hand-lever is oscillating in one direction or in the other. My invention also comprises devices for reversing the direction of the movement of the driving-shaft, consisting of three or more pinions adapted to be moved sidewise along the shaft by means of a suitable lever or the like, said pinions being connected to the shaft by the ratchet movements in such a manner that when the pinions are placed in one of their extreme positions the driving-shaft will be turned in one direction, and by moving the pinions to their other extreme position the axle will be turned in the opposite direction.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a railway-velocipede provided with a propelling mechanism according to my invention. Fig. 2 is an end view of the same, partly in section. Figs. 3 and 4 show modifications of the racks and pinions adapted to be used with axles that are parallel with the hand-lever. Fig. 5 is a side view of the pinions and parts of the rack on a larger scale, and Fig. 6 is a cross-section of the same.

Referring to the drawings, *a* represents the driving-axle, to which by means of ratchet arrangements are attached three pinions *c d f*

in such a manner that the side pinion *f* turns the axle in opposite direction to that of the pinions *c* and *d*. For the ratchet arrangement I prefer to use steel rolls *b*, inserted in notches in the pinion between the same and its nave; but any other suitable ratchet movement may be used. A handle-lever *i* is journaled in the frame, so as to constitute a lever of the first order, and at its lower end provided with cog-sectors or curved racks *h k*, the centers of which are in the fulcrum of the hand-lever *i*. The said racks are adapted to mesh with the said pinions on opposite sides of the axle. In the drawings the pinion *c* is shown of larger diameter than the other pinions, so that the ratio of gearing between the outer rack and its pinion is smaller than the ratio of gearing with the inner rack, the purpose of which is to utilize the power of the arms to the best advantage, it being thus made easier to push the hand-lever than to pull the same. As the rack *h* meshes with the pinion *d* on the upper side of the axle and the rack *k* meshes with the pinion *c* on the lower side of the axle, and the wedge-shaped notches in the naves having the same direction in both pinions, only the one pinion turns the shaft, while the other runs free in a direction opposite to that of the shaft. As soon as the direction of the lever *i* and the pinions *c d* is changed the pinions turn in directions opposite to their former rotation, whereby the pinion that formerly turned the shaft now rotates free in the opposite direction, while the other pinion turns the shaft. The axle will thus be turned in the same direction whether the hand-lever is moved backward or forward. The pinions *c d f* are adapted to be moved along the shaft *a* by means of a convenient switch device in order to propel the railway-velocipede in an opposite direction. In the position shown in the drawings the lower rack *k* meshes with the larger pinion *c*, the upper rack *h* meshing with the smaller pinion *d*. If the railway-velocipede is to be propelled in an opposite direction, I only move the pinions along the shaft *a* in such a manner that the upper sector *h* meshes with the pinion *f*, thus totally uncoupling the lower sector *k*. The wedge-shaped notches in the naves of the pinion *f* having a direction opposite to that of the

notches in the other pinions *c* and *d*, the shaft evidently must now rotate in the opposite direction.

The modification shown in Figs. 3 and 4
5 consists in making the racks conical instead of cylindrical, so as to be adapted for an axle whose direction is about the same as that of the hand-lever. This and other such modifications will be well understood by any person skilled in the art to which it appertains.
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My device for the propelling of railway-velocipedes has many advantages compared with devices hitherto known. The most important advantages are that there will be no
15 dead-points, but the power is the same during the whole stroke. The length of the stroke may also be altered as desired, so that persons of different bodily sizes may use the railway-velocipede with the same advantage.
20 The forward and backward moving weights are also balanced. When the railway-velocipede runs by gravity on level roads and down hills, the person riding it will not be disturbed by any oscillating lever, since all the
25 forward and backward moving parts are at

rest as soon as no propelling is done by the rider. The weight of the vehicle, as well as the frictional losses, is also diminished by the absence of a number of large cog-wheels.

I have described my invention as applied 30 to a railway-velocipede; but it is obvious that it may be equally well applied to any vehicle propelled by hand.

What I claim, and desire to secure by Letters Patent, is— 35

In a railway-velocipede the combination of an oscillating hand-lever provided with two concentric gear-wheel sectors, and three ratchet-pinions on the driving-shaft adapted to be moved sidewise along the same, substantially 40 as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 9th day of December, 1897.

GUNNAR TJERNELD.

Witnesses:

H. OSTBERG,
BERTIL BRANDER.