

No. 612,315.

Patented Oct. 11, 1898.

M. J. DORAN.  
CHAINLESS BICYCLE.  
(Application filed Dec. 31, 1897.)

(No Model.)

2 Sheets—Sheet 1.

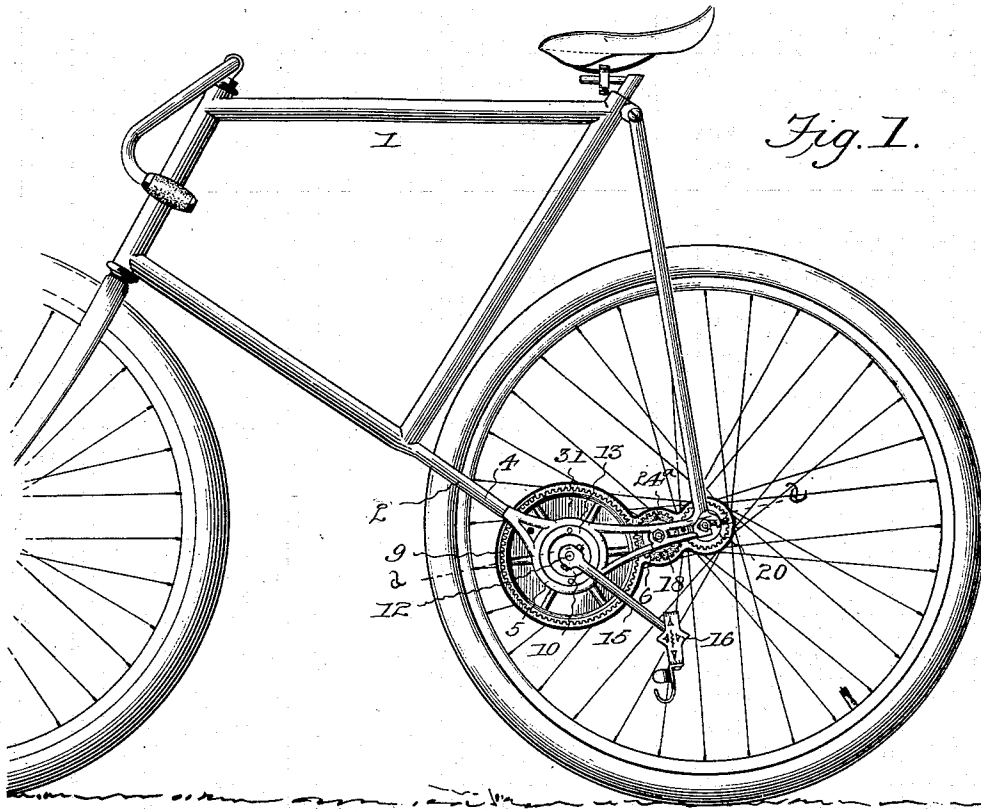


Fig. 1.

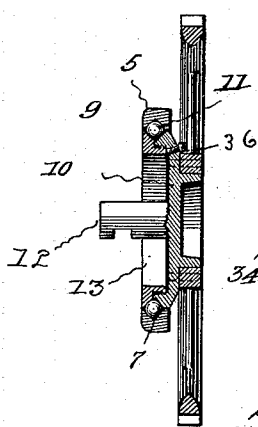


Fig. 3.

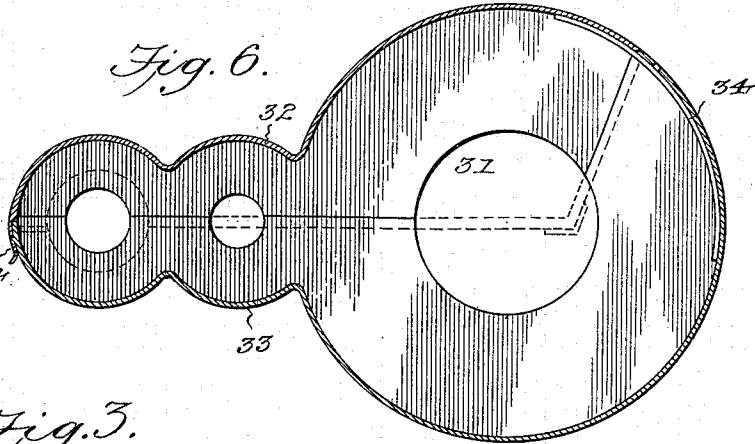


Fig. 6.

Witnesses

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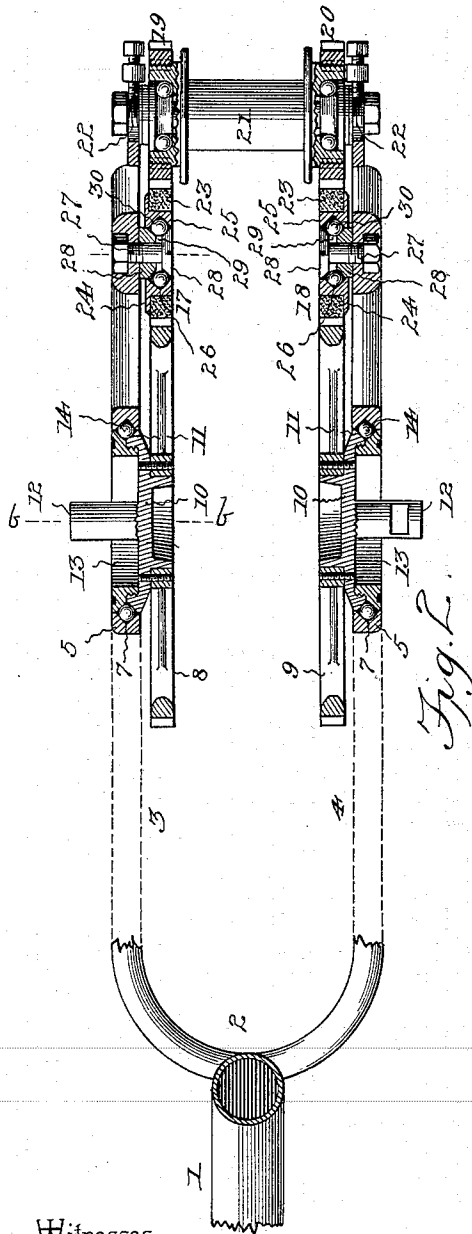


Fig. 1.

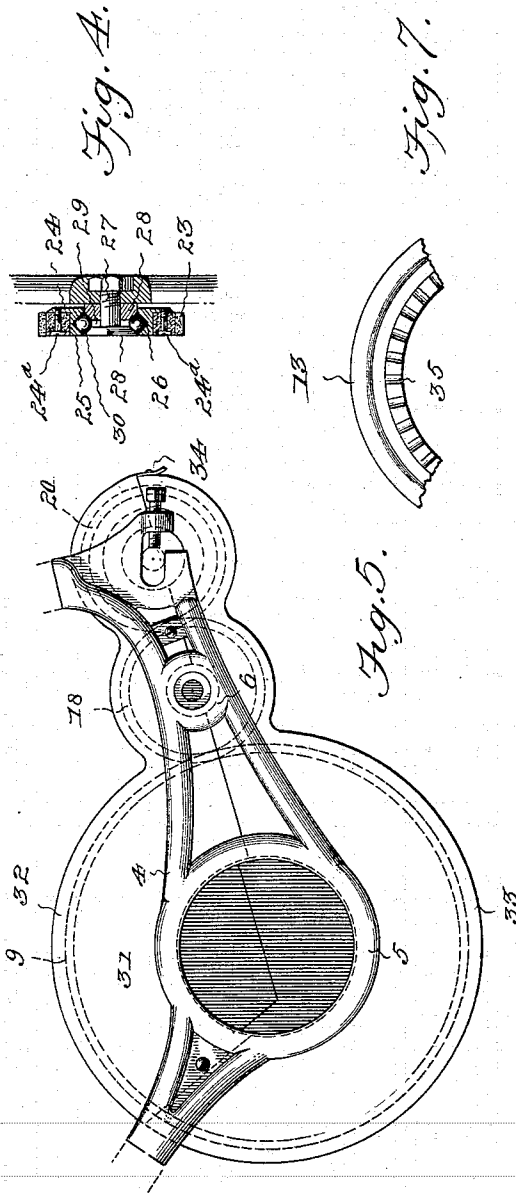


Fig. 2.

Fig. 3.

Fig. 4.

Witnesses

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# UNITED STATES PATENT OFFICE.

MAURICE J. DORAN, OF ROCHESTER, NEW YORK.

## CHAINLESS BICYCLE.

SPECIFICATION forming part of Letters Patent No. 612,315, dated October 11, 1898.

Application filed December 31, 1897. Serial No. 664,985. (No model.)

*To all whom it may concern:*

Be it known that I, MAURICE J. DORAN, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented a new and useful Chainless Bicycle, of which the following is a specification.

My invention relates to improvements in chainless bicycles; and one of the objects that I have in view is to provide an improved propelling-gear in which the parts are arranged to bring the pedal-cranks directly beneath the seat-post and saddle to avoid lost motion and enable the rider to apply power directly to the cranks and to the best advantage.

A further object is to render the gear noiseless in action and at the same time to so mount or support the parts as to reduce friction and wear to a minimum and thereby promote the durability and service of the machine.

A further object is to provide an improved propelling-gearing having its parts arranged compactly with a view to reducing the length of the bicycle.

With these ends in view my invention consists in the novel combination and construction of parts, which will be hereinafter fully described and claimed.

To enable others to understand the invention, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a side view of so much of a bicycle as is necessary for an understanding of my invention and showing the improved propelling-gearing applied thereto. Fig. 2 is a horizontal longitudinal sectional view on the plane indicated by the dotted line *a a* of Fig. 1. Fig. 3 is a vertical cross-sectional view through the master-gears on the plane indicated by the dotted line *b b* of Fig. 2. Fig. 4 is a vertical cross-sectional view, on an enlarged scale, through the intermediate noise-deadening idler-pinion forming one of the elements of the propelling-gearing. Fig. 5 is a detail view of one member of the rear fork. Fig. 6 is a detail view of a casing for the propelling-gearing. Fig. 7 is a detail view of a part of the adjusting-cone for one of the master-gears.

Like numerals of reference denote like and

corresponding parts in each of the several figures of the drawings.

1 indicates the frame of a bicycle, which in all substantial respects except as to the rear fork is similar to the frames of ordinary safety-bicycles. I have constructed the rear fork 2 of the bicycle-frame in a manner to support the various working parts of the propelling-gearing, and each side or member of said rear fork is of trussed construction to render the same as light as possible consistent with the necessary strength and durability to stand the strain and support the various elements of the propelling-gearing in proper relation to each other. The members 3 4 of the rear fork are joined together at the crown in any suitable way to enable the same to be attached to the seat-post socket and the lower reach of the bicycle-frame, and each member of said rear fork has an annulus or open ring 5 and a supporting-bearing 6. The annulus or open ring 5 constitutes a bearing for one of the master-gears, while the supporting-bearing 6 receives the fixed journal of one of the intermediate idler-pinions. Said annular bearing 5 is grooved or channeled interiorly to provide a raceway 7 for the ball-bearings of one master-gear, as will presently appear.

8 9 represent the master-gears, which are journaled in the annular bearings 5 of the rear fork 2 at points opposite to each other, and each master-gear is equipped with a pedal-crank which is rigidly attached to said master-gear for the purpose of rotating the same within its bearing. Each master-gear is formed with a laterally-extended hub or plate 10, the periphery of which is curved or inclined to form in part a raceway, and rigid or integral with this hub or face-plate of the master-gear is a short crank-shaft 12. The inclined periphery of the hub or face-plate of the master-gear is flanged to receive a cone 13, which is attached directly to said master-gear in any suitable way, and one face of this cone 13 is shaped reversely to the peripheral edge 11 of the master-gear hub or face-plate 10, so that the cone and the peripheral edge 11 form a raceway which when the master-gear and cone are properly fitted to the annular bearing 5 lies opposite to and within the raceway of said annular bearing. Within

the raceways of the annular bearing and the master-gear and its cone are fitted the ball-bearings 14, which sustain the master-gear in proper relation to the frame-fork and reduces to a minimum the friction between said master-gear and its annular bearing 5. It is to be observed that the hub of the master-gear has an external annular support within the annular bearing 5 of the frame-fork, and, if desired, the cone 13 may be attached adjustably to the hub or face-plate of the master-gear for the purpose of taking up wear in the raceways and bearings of said master-gear.

The pedal-cranks are indicated at 15 and the pedals at 16. The pedal-cranks are attached in any suitable way to the short crankshafts 12 of the master-gears and the cranks and pedals are of any suitable or preferred construction familiar to those skilled in the art.

The master-gears mesh with the intermediate idler-gears 17 18, and the driving-pinions 19 20 in turn mesh with said intermediate gears 17 18. The intermediate gear 17 and the driving-pinion 19 on one member of the rear fork form the operative connection between one master-gear 8 and the rear hub 21, while the other idler-gear 18 and driving-pinion 20 constitute the operative connection between the other master-gear 9 and said hub of the rear wheel. It will thus be seen that I have provided two sets of gearing, supported on the respective members or sides of the rear frame-fork, and that one set of gears, with its pedal-crank, is entirely independent of the other set of gearing and pedal-crank. The gears forming one set on one side of the machine are supported on the frame-fork, so that their centers are in the same horizontal plane, and the cranks of the two master-gears are arranged at right angles to each other in the ordinary way to enable the rider to apply power to the propelling-gearing to good advantage.

The rear wheel has its hub 21 mounted in the usual or any preferred way on the non-rotatable axle 22, supported suitably in the rear extremities of the fork 2.

One of the important features of my improved propelling-gear resides in the employment of noise-deadening gears, forming part of the train of gears between the pedal-cranks and the rear axle, thus overcoming one of the objections to a chainless propelling-gear for bicycles. I prefer to make each intermediate idler-gear 17 18 the noise-deadening member of the train of gearing, and in the preferred embodiment of my invention I use rawhide as the material to constitute the sound-deadening medium. Each intermediate idler-pinion is a composite pinion—that is to say, it consists of a toothed rawhide annulus and a metallic bearing therefor. The rawhide annulus 23 of each intermediate idler-pinion is provided on its peripheral edge with a series of gear-teeth adapted to mesh with one of the master-gears and with one of the driving-pin-

ions on the rear-wheel hub, and this toothed rawhide annulus is clamped rigidly in place to the face-plate 24 by the screws 24<sup>a</sup>, which pass through the annulus and into the face-plate to rigidly join the face-plate and the rawhide annulus in fast firm relation to each other. The face-plate 24 of each composite idler-pinion has a metallic hub 25, which extends through the rawhide annulus, and said metallic hub 25 is provided with an interior groove or channel 26, forming one of the raceways for the ball-bearings of said composite intermediate pinion. The pinion is supported in position on the rear fork by a fixed journal 27, which is attached to the supporting-bearings 6 of the fork 2 in any suitable way, and said journal 27 is provided with the cones 28, arranged on said journal to provide the raceway 29 opposite to the raceway 26 in the hub of the composite idler-pinion. One of the cones, 28, of the fixed journal 27 is attached to or made integral with said journal to occupy a fixed position thereon, while the other cone, 28, is adjustable on said fixed journal 27 toward or from the fixed cone thereon to take up the wear between the working parts of the bearing for the idler-pinion. The raceway 29, provided by the cones 28, is within and immediately opposite to the raceway 26 in the metallic hub of the composite pinion, and in said raceways are fitted the ball-bearings 30, which support the composite idler-pinion in a manner to reduce friction and wear on its journal 27.

The driving-pinions 19 20 are attached to the hub of the rear wheel in any suitable way, and in one embodiment of my invention I provide two right and left hand threads on the respective ends of the rear hub 21 to enable the pinions 19 20 to be screwed firmly to the said hub.

To protect the sets of gearing forming part of the propelling mechanism, I employ the casings 31. Each casing is constructed to inclose the master-gear, the idler-pinion, and the drive-pinion of one set of the gearing on one side of the axial line of the bicycle, and said casing is attached by screws 32 to a member of the rear fork 2. The casing may be constructed of sheet metal or any other suitable material and be attached removably to the fork for the purpose of permitting access to the gearing whenever desired. Said casing incloses the gearing practically on all sides thereof to prevent the lodgment of dust and dirt in the teeth of the several gears, and it also affords a protection against the dresses of lady riders being caught in the teeth of the intermeshing gears.

From the foregoing description, taken in connection with the drawings, it will be seen that I have provided an improved propelling mechanism in which the pedal-cranks are arranged substantially in the vertical plane or line of the seat-post and the saddle, thereby enabling the rider to apply power to the pedal-cranks without lost motion. The several mem-

bers of the gear are arranged compactly with relation to each other, and such construction and arrangement of parts is important, in that provision is made for shortening the length of the rear fork, thereby enabling the rear wheel to be brought closer to the front wheel and reducing the aggregate length of the bicycle from eight to twelve inches shorter than the bicycles of ordinary construction. The several gears forming parts of my improved mechanism are mounted so that the wear due to friction on the working parts may be taken up by proper adjustment of the bearings for the master-gear and idler-pinions, and by employing a composite construction for the idler-pinions I am enabled to reduce the noise due to the gears intermeshing with each other, thus producing practically a noiseless and chainless propelling mechanism for bicycles. It is evident that slight changes in the form, proportions of parts, and in the details of construction may be made without departing from the spirit or sacrificing the advantages of my invention.

In the practical construction of the master-gear I prefer to attach the cone 13 to its face-plate by screwing the cone in place, and, as shown by Fig. 7, this adjusting-cone is provided at its inner face with a series of radial notches 35, into which take one or more screws 36, (see Fig. 3,) mounted in the hub of the master-gear to hold the cone securely in place.

In Fig. 6 of the drawings I have represented the casing 31 as divided longitudinally on a transverse horizontal line to form the sections 32 33, which are coupled together detachably by interlocking devices 34, so that the casing-sections may be detached and removed for ready access to the gears.

Having thus described the invention, what I claim is—

1. A bicycle propelling-gear comprising a rear fork having the annular bearing 5 formed with an internal raceway, a master-gear provided with the offstanding face-plate having a beveled outer edge and a threaded inner edge, an adjusting-cone screwed into the threaded edge of the face-plate and forming, with the beveled edge of said plate, a raceway which is opposed to the raceway of the annular bearing, the bearing-balls confined within the raceways, an idler-gear supported in said fork and meshing with the master-gear, and the hub-gear in mesh with the idler-gear, substantially as described.

2. In a bicycle propelling-gear, the combination with a frame-fork having an open bearing, 5, formed with a raceway, of the master-gear having its face-plate provided with a central stub-shaft and fitted at its circumference in the bearing, 5, an adjusting-cone screwed into the circumferential edge of the face-plate to form therewith a raceway opposite to the raceway of the bearing and said cone having the radial notches, 35, at its inner edge, the screws passing through the master-gear to engage with the notched edge of the adjustable cone, the ball-bearings, 7, a driven gear on the rear-wheel hub, and an idler-pinion between the master-gear and the driving-gear, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

MAURICE J. DORAN.

Witnesses:

MORRISON H. McMATH,  
MAGULER BUTLER.