

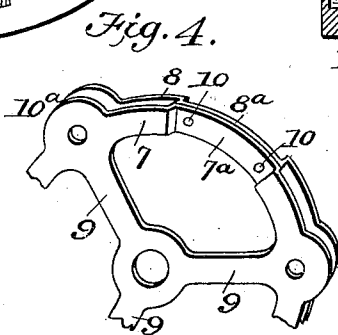
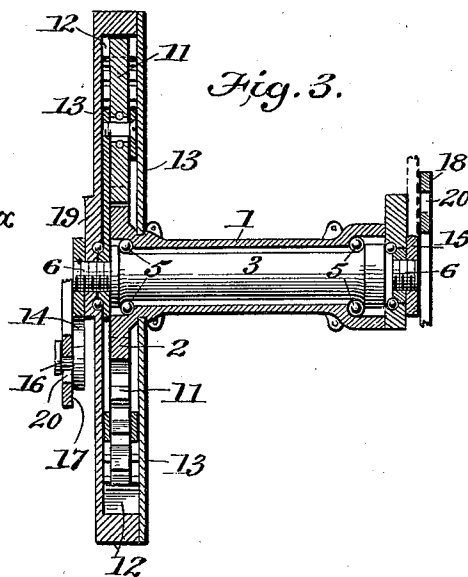
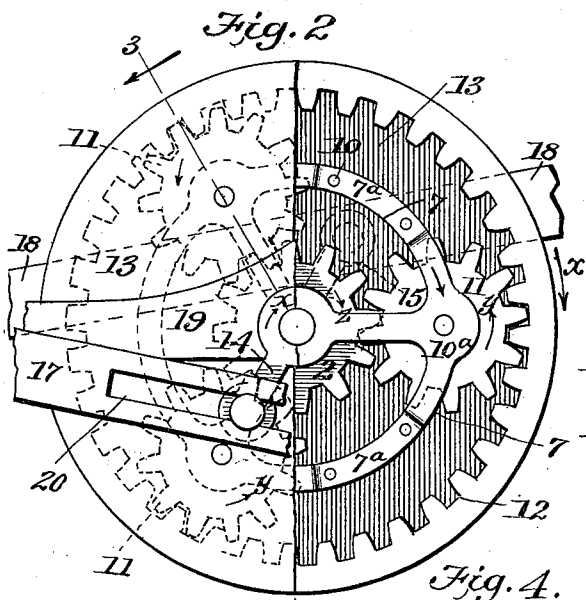
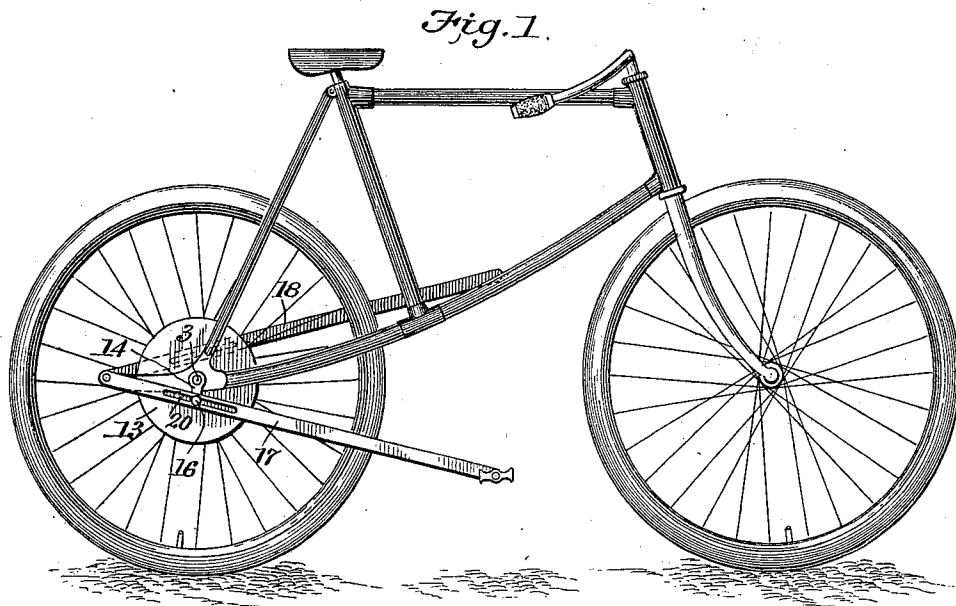
No. 627,977.

Patented July 4, 1899.

J. A. CALDWELL.
BICYCLE GEARING.

(Application filed May 26, 1897. Renewed Nov. 28, 1898.)

(No Model.)



WITNESSES:
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JOHN A. CALDWELL, OF VANCOUVER, CANADA.

BICYCLE-GEARING.

SPECIFICATION forming part of Letters Patent No. 627,977, dated July 4, 1899.

Application filed May 26, 1897. Renewed November 28, 1898. Serial No. 697,711. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. CALDWELL, of Vancouver, in the Province of British Columbia and Dominion of Canada, have invented certain new and useful Improvements in Bicycle-Gearings; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in drive-gear mechanism for bicycles or other manually-propelled vehicles of that class in which a multiple or fast speed is imparted to the drive-wheel from a crank-axle rotating at a somewhat slower speed.

Among other objects this invention seeks to provide a drive-gear of this character of a very simple but effective construction, by which a great speed and power with a minimum amount of friction is obtained with a slow and small foot-leverage power, in which the gearing is compact, arranged dust-proof, and capable of being applied to any form of bicycle or other manually-propelled vehicle.

The invention comprehends the peculiar combination and details of construction such as will be first described in detail and then be specifically pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a safety-bicycle equipped with my improvements. Fig. 2 is a face view of the operating-gear devices, part of the casing being removed to the more clearly illustrate the parts. Fig. 3 is a vertical cross-section taken on the line 3 3 of Fig. 1. Fig. 4 is a detail view of a portion of pinion-carrying ring-frame, hereinafter specifically referred to.

In the practical application my improved gear mechanism may be applied to any form of bicycle. When to a front drive-wheel, the cranks can be of a sufficient length to receive the ordinary propelling-pedals. When applied to the modern or safety style of bicycles, the crank-axle is arranged to be rotated by means of swinging levers having foot members.

Generally the drive-gear devices comprise a fixedly-held internally-toothed annulus, a

rotary hub having a drive-gear, an axle held to rotate within the hub having an annular ring or frame fixedly connected thereto to turn therewith, which carries a plurality of drive-pinions held to mesh with the internally-gear fixed annulus and by contact therewith rotated in a direction reverse to the direction of movement of the frame supporting them, whereby to rotate the hub-pinion in a direction (forward) with the rotation of the shaft at a greater speed and increased power.

Referring to the accompanying drawings, in which like numerals indicate like parts in all the figures, 1 indicates the rear-wheel hub, which runs freely on the ball-bearings 5, engaging the crank-axle 3, which is also held to rotate. The hub 1 carries at one end a cog-pinion 2, held in a vertical plane with the internally-toothed annulus 12, fixedly secured to a rigid part 19 of the bicycle-frame, it being incased at both sides by the disk-plates 13 12, as clearly shown in Fig. 3 of the drawings.

7 and 8 indicate a pair of rings, each having inturned portions 7^a and 8^a, which are joined by rivets or screws 10, whereby to form the two rings in an annular frame, having a series of intervening openings or bifurcated portions 10^a, in each of which is journaled a pinion 11, adapted to mesh with the internally-toothed annulus 12 and the hub-pinion 2, as clearly shown in Fig. 2.

The pinion-carrying frame has radial arms 9, terminating in a hub portion, which is fixedly secured to the crank-axle to turn therewith.

14 and 15 indicate the cranks, which are secured to the threaded ends 6 of the axle 3. These cranks have roller crank-pins 16, which work in the longitudinal slots 20 of pedal-levers 17 18, fulcrumed on the bicycle-frame, as shown in Fig. 1.

By constructing a drive-gear as described and shown it is manifest that when the levers 17 and 18 are reciprocated vertically a rotary motion is imparted to the crank-axle, which is rotated forward, as indicated by the arrow X. As the frame carrying the pinions 11 is fixedly connected to the crank-axle, it follows that the pinion 11 will be swept forward of the frame and during such movement be rotated by engagement with the annulus 12

in a reverse direction, (see arrows *y*,) which movement imparts a forward movement (see arrow *z*) to the hub-pinion 2.

By providing a fixed internal gear, a central gear 2, and the planet-movement gears 11, arranged as shown, it is manifest that a multiple speed, the degree of which is dependent on the relative diameters of the pinions 11 and 2, is imparted to the pinion 2, the leverage power of which is also increased in accordance with the number of gears held to engage it and the annulus 12.

I am aware that speed-gearing for bicycles has been provided in which a central or axis gear and series of fixedly-held rotary gears operated from the central gear, which in turn engage a drive-wheel, having internal teeth to impart increased speed and power to such wheel. This construction I do not claim; but

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

1. A drive-gearing comprising a stationary internally-toothed annulus, a hub-pinion, a frame composed of a pair of rings having in-
turned portions arranged at intervals, se-

cured together and forming intervening openings 10^a, and pinions journaled in the openings 10^a, and meshing with the annulus and the hub-pinion, substantially as described.

2. A drive-gear, comprising a crank-axle having a crank; a hub on the crank-axle having a pinion fixedly held thereon; a stationary disk having an integrally-formed internally-toothed annulus; a second disk opposing the annulus-disk and secured thereto; a frame mounted on the crank-axle consisting of a pair of rings held fixedly connected at intervals and separated at the intervening points; pinions journaled on the said frame in the separated portions thereof meshing with the annulus and the hub-pinion, all being arranged substantially as shown and for the purposes described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN A. CALDWELL.

Witnesses:

D. R. G. BALLANTYNE,
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