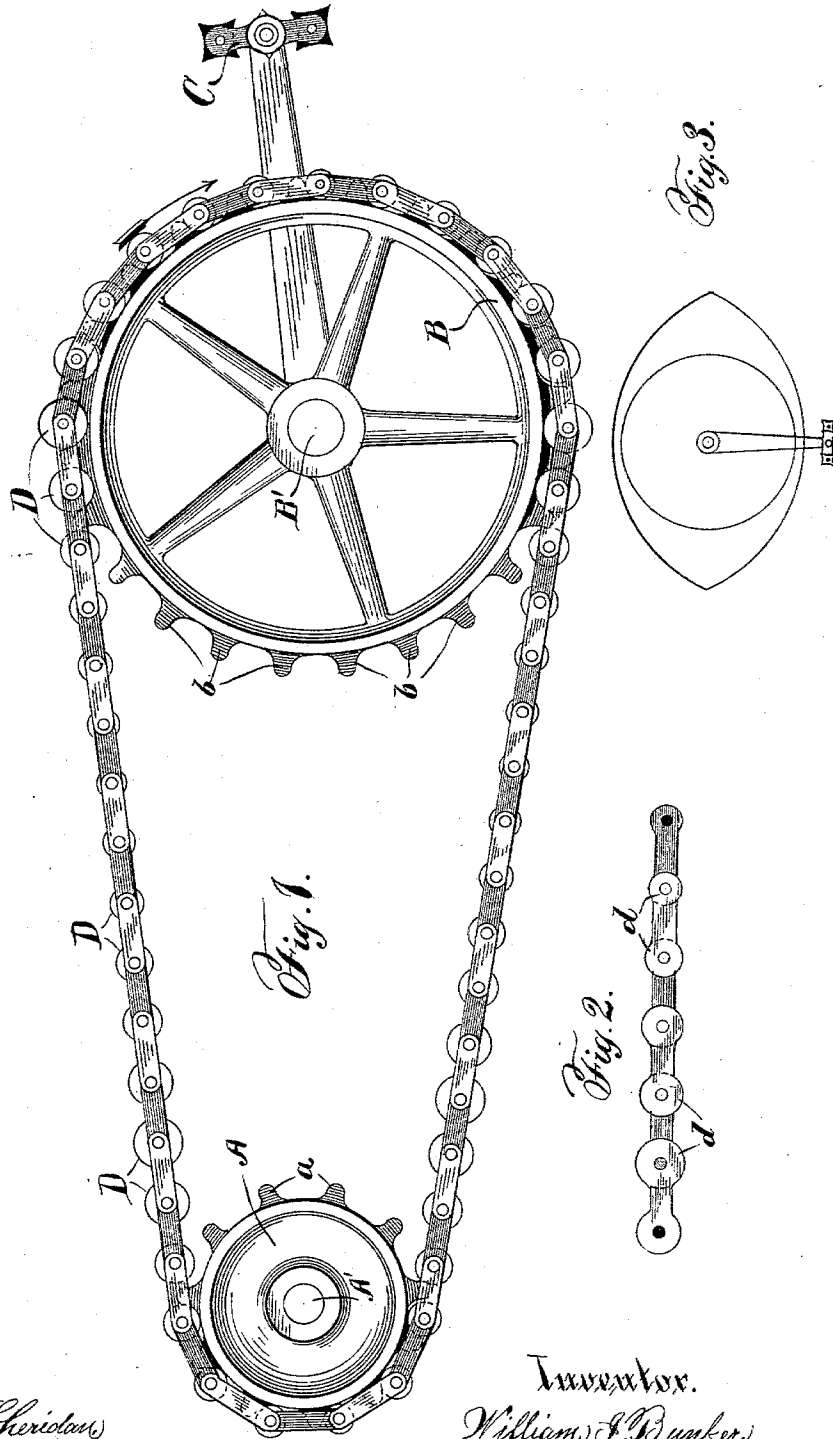


(No Model.)

W. I. BUNKER.
GEARING.

No. 562,704.

Patented June 23, 1896.



Witnesses.
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UNITED STATES PATENT OFFICE.

WILLIAM I. BUNKER, OF LA GRANGE, ILLINOIS.

GEARING.

SPECIFICATION forming part of Letters Patent No. 562,704, dated June 23, 1896.

Application filed March 28, 1893. Serial No. 468,086. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM I. BUNKER, a citizen of the United States, residing at La Grange, Illinois, have invented certain new and useful Improvements in Gearing, of which the following is a specification.

The object of my invention is to provide a gearing consisting of sprocket-wheels connected by a chain, so constructed and arranged as to contact the sprockets of the wheels in an approximately elliptical path; and my invention consists in the features and details of construction and operation hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of a pair of sprocket-wheels containing my improved chain. Fig. 2 is a side elevation of a modified form of chain, and Fig. 3 is a diagrammatic view representing the elliptical path where the chain contacts the sprockets, in an exaggerated form.

In making my improved gearing I make a sprocket-wheel A, provided with sprockets or lugs *a*, and mounted on a shaft A', which contains the wheel intended to be rotated. I make another sprocket-wheel B, provided with sprockets or lugs *b*, and mounted on preferably a pedal crank-shaft B', which carries pedals C, to which power may be applied by the pressure of the foot. I may say here that my invention, as illustrated in the drawings, is intended for use on a bicycle; but I have not deemed it necessary to represent the wheels, frame, saddle, and other parts, which will be readily understood. As shown in Fig. 1, I provide the driving-chain with friction-rolls D, which are held in place by rivets connecting the links together. A number of these friction-rolls are arranged together, gradually decreasing from the maximum size in each direction till the smallest roll is reached, when the diameter of the rolls gradually increases again until the maximum size is again reached. As the large rolls pass around the sprocket-wheels the links of the driving-chain all have their pivotal points at a greater distance from the axis of rotation than when the small rolls pass around the sprocket-wheels. The distance of the driving-chain from the axis of rotation will therefore vary from time to time as different-sized

rolls engage the sprockets or lugs of the sprocket-wheels. The chain instead therefore of describing a true circle will describe approximately an elliptical path.

By reference to the sprocket-wheel B, it will be noticed that two of the largest rolls are respectively at the top and bottom of the wheel, while the smallest rolls are at the right-hand side of the wheel. The links at the side of the wheel are therefore closer to the axis of rotation than those at the top and bottom. From the position of the chain on the wheel B the elliptical path of the chain will be readily understood. The rolls are arranged preferably in the driving-chain, so that the major axis of the ellipse will be approximately at right angles to the pedal-crank or position of the pedal, and so that at such time the small rolls will be passing around the wheel A. As the small rolls pass around the wheel A they will be able to rotate it at the desired speed by a somewhat slower movement of the pedals, while as the large rolls pass around the wheel A they will, to rotate it at a given speed, require a somewhat quicker movement of the pedals. The large and small rolls are placed on the driving-chain at such positions as that the above results will be secured at those times in the rotation of the pedals when it is most easy and convenient for the operator to move them slowly or rapidly, respectively. For instance, the slower rotation of the pedals, as illustrated in the drawings, comes during their downward movement, when it is easier for the foot to maintain its pressure on them if moving slowly than rapidly; and the more rapid movement of the pedals comes at the time they are passing their dead-centers, when it is more convenient and desirable that they should move rapidly.

In Fig. 2 I have shown a modification of the driving-chain. In this case, instead of providing the links with literal friction-rolls, I have provided the ends of the links with enlarged heads or lugs *d*, to contact with the lugs or sprockets on the sprocket-wheels. These enlarged heads vary in size, as do the friction-rolls above described, and for the same purpose.

While I have described more or less pre-

cise forms in the construction of my invention, I do not intend to be limited thereto unduly any more than is pointed out in the claims. On the contrary, I contemplate 5 changes in forms, construction, and arrangement and the use of equivalents as circumstances may suggest or necessity render expedient.

What I regard as new, and desire to secure 10 by Letters Patent, is—

1. In gearing, the combination of a sprocket-wheel and a sprocket-chain composed of alternating series of large and small headed links adapted to contact the sprockets at different 15 distances from the axis of rotation,

during the rotation of the sprocket-wheel, substantially as described.

2. In gearing, the combination of a wheel, a crank-shaft on which it is mounted, pedals by which the crank-shaft is rotated, and a chain 20 constructed of alternating large and small sections for moving the chain from or toward the axis of rotation of the wheel at those periods in its rotation when the pressure on the pedals is greatest and least, respectively, 25 substantially as described.

WILLIAM I. BUNKER.

Witnesses:

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