(No Model.)

G. BARKER.

VELOCIPEDE DRIVING GEAR.

No. 601,824. Patented Apr. 5, 1898.

Fig. 7.

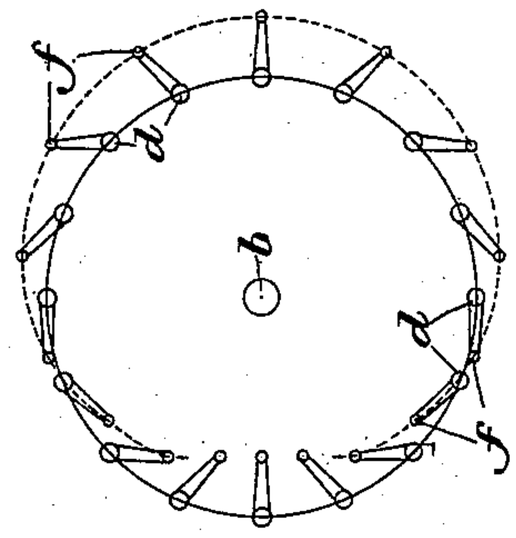


Fig. 4.

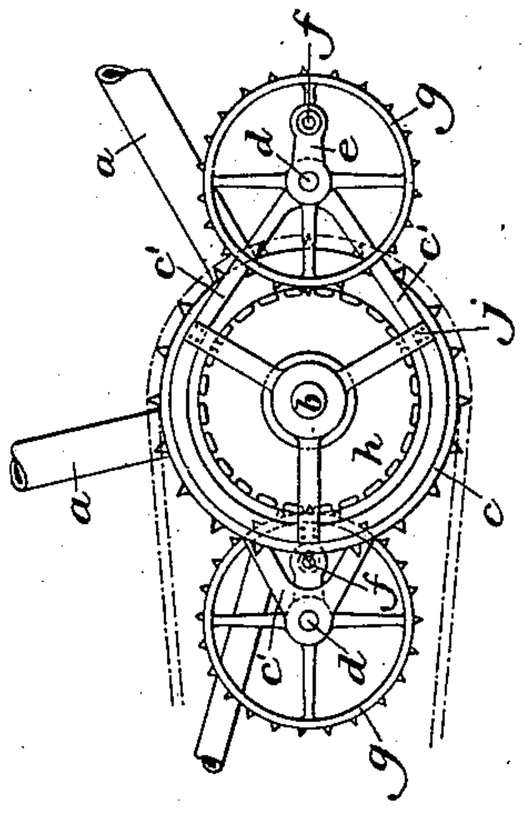


Fig. 5.

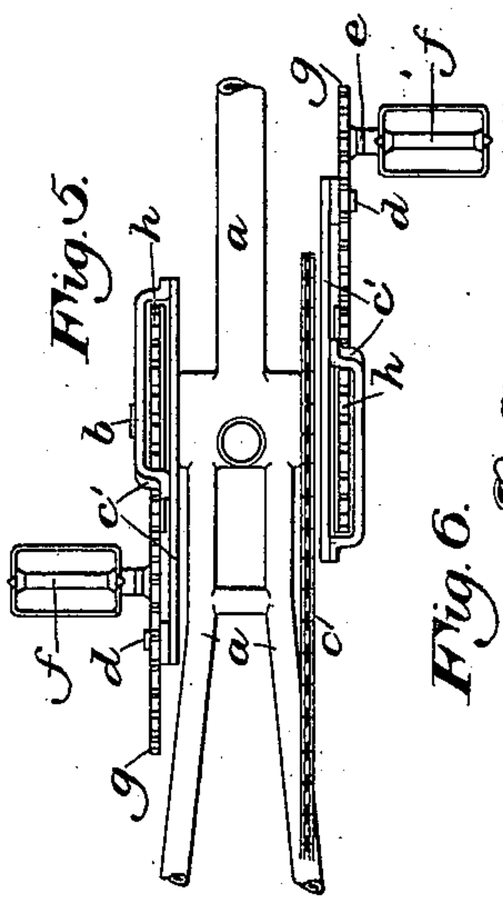


Fig. 6.

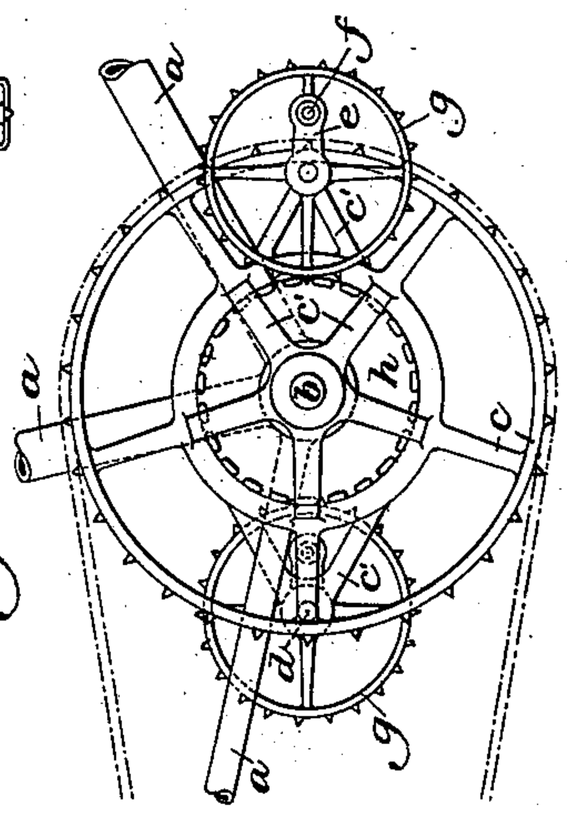


Fig. 1.

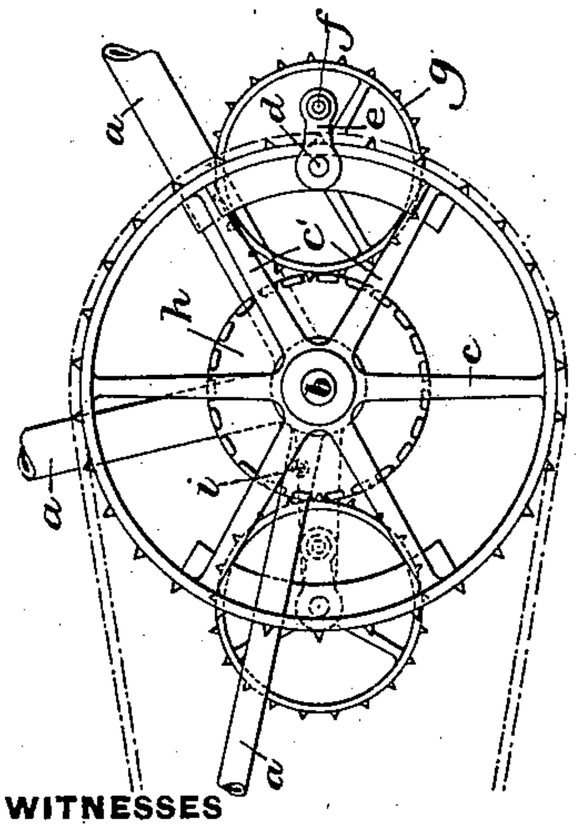


Fig. 2.

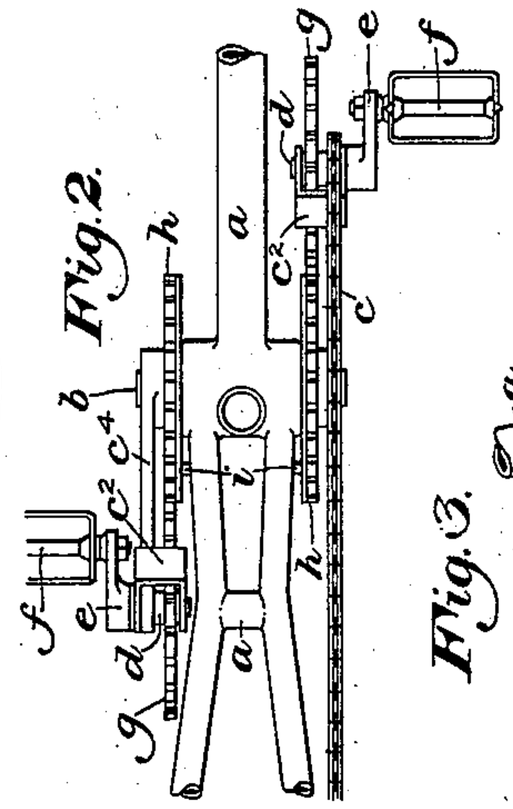
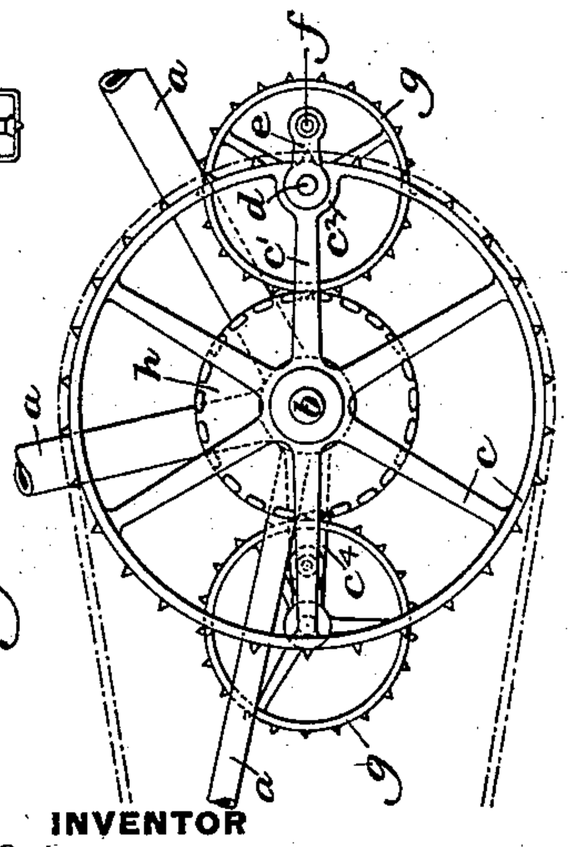


Fig. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

GERALD BARKER, OF LONDON, ENGLAND.

VELOCIPEDE DRIVING-GEAR.

SPECIFICATION forming part of Letters Patent No. 601,824, dated April 5, 1898.

Application filed November 27, 1896. Serial No. 613,517. (No model.) Patented in England November 16, 1894, No. 22,151; in France August 29, 1895, No. 249,956; in Belgium August 30, 1895, No. 117,325, and in Germany September 7, 1895, No. 86,700.

To all whom it may concern:

Be it known that I, GERALD BARKER, a subject of the Queen of Great Britain, residing at Westminster, London, England, have invented new and useful Improvements in Velocipede Driving-Gear, (for which I have obtained patents in the following countries: Great Britain, No. 22,151, bearing date November 16, 1894; France, No. 249,956, bearing date August 29, 1895; Belgium, No. 117,325, bearing date August 30, 1895, and Germany, No. 86,700, bearing date September 7, 1895,) of which the following is a specification.

This invention relates to the crank driving-gear of velocipedes.

The main object is to increase the speed and render the propulsion easier by applying the pressure upon the pedals to greater advantage.

The invention consists, essentially, in providing mechanism for causing the pedals to travel around the main crank-spindle in a somewhat eccentric or elliptical path or course. When descending, the pedals are at an increased distance from the crank-spindle and power is therefore applied to greater advantage. When the pedals are ascending, they are at a reduced distance from the crank-spindle. By the above means the advantage of a long crank-throw is obtained without the fatigue consequent upon the feet having to travel around the spindle at a larger radius.

In carrying my invention into practice I cause the crank-spindle to pass through the center of the driving wheel or wheels, and the said spindle is attached directly thereto or power is conveyed to the said wheels by suitable gear. If desired, the crank-spindle is mounted in separate bearings and power is conveyed to the driving wheel or wheels by an endless chain or chains, gear-wheels, or the like, and the somewhat eccentric or elliptical course or path of the pedals is obtained as follows: Secondary cranks, crank-wheels, or crank-disks have their spindles mounted in bearings at the outer ends of the main cranks, crank-wheels, or crank-disks, the pedal-pins being fixed to the outer ends of the secondary cranks or near the periphery of the crank-wheels or crank-disks. Toothed planet-wheels keyed or otherwise attached to the secondary crank-spindles, crank-wheels, or crank-disks engage directly with stationary toothed sun-wheels of the same diameter as the planet-wheels and concentric with the main crank-spindle. The centers of the sun-wheels must coincide with the center line or axis of the main crank-spindle. The sun-wheels are preferably bored out, so that the main crank-spindle passes through them without touching, in order to avoid friction and provide room for the crank-spindle bearings.

In the drawings, Figure 1 is an elevation, and Fig. 2 is a plan, of driving-gear constructed in accordance with my invention. *a* is part of the framework of a velocipede. *b* is the main crank-spindle. *c* is a chain-wheel secured to the crank-spindle *b* and giving motion by means of a chain in the usual manner to the rear wheel of a bicycle. Two arms *c'* of the said wheel, together with bow or divided rim c^2, form the main cranks at one end of the spindle. c^4 is the main crank at the other end of the spindle. The crank c^4 also carries a bow c^2. *d* are secondary crank-spindles carried in bearings in the bows c^2. *e* are secondary cranks. *f* are the pedal-pins and pedals. *g* are toothed planet-wheels secured to the secondary crank-spindles *d* and gearing with stationary sun-wheels *h*, secured by set-screws or other suitable devices *i* to the framework *a*, or by brazing to the bracket *a'*. The sun-wheels *h* are bored out to receive or allow room for the bearings for the main crank-spindle *b*. The sun-wheel may consist of a toothed ring attached to the frame by set-screws or the like passing through slots in the said ring, so as to allow the angle of leverage to be readily adjusted. If the slots are symmetrically placed, the sun-ring may be turned partly around its axis from time to time to insure even wear. Planet-wheels may be similarly constructed.

Fig. 3 is a modification of gear similar to that described in Figs. 1 and 2, with the exception that the bows or divided rim or end is dispensed with and that the secondary crank-spindles *d* are carried in a bearing or bearings in bosses c^2 on the arms *c'* of the chain-wheel *c* or crank c^4. When the main

crank-spindle *b* passes through the center of the driving-wheel and is attached or geared thereto—say as in a front-driving bicycle—a crank similar to c^4 is used instead of the chain-wheel. This applies to both Fig. 1 and Fig. 3.

Fig. 4 is an elevation, and Fig. 5 is a plan, showing a modification of driving-gear in which crank-arms *c'*, secured to the main crank-spindle *b*, carry fixed crank-pins which serve as secondary crank-spindles *d*, around which the secondary cranks *e* and planet-wheels *g* rotate. The planet-wheels *g* engage with the sun-wheels *h*, as before described. When chain-wheels are used, the crank-arms *c'* are secured to the chain-wheel *c* by set-screws or other suitable devices *j*, as shown.

Fig. 6 is an elevation of gear similar to that described under Figs. 4 and 5, with a large chain-wheel *c* formed solid with the arm *c'* of the main crank and of such diameter as to include the boss c^2 for the secondary crank-spindle *d* within the rim of such chain-wheel.

Fig. 7 is a diagram showing the position of the main crank-spindle *b*, secondary crank-spindles *d*, and pedal-pins and pedals *f* at various points during a complete revolution, the arrow showing the direction of motion.

On reference to the above diagram it will be seen that when applying power the pedals travel quickly down through an increased distance as compared with pedals attached directly to a main crank-pin and that during the remainder of the revolution the pedals pass upward through a decreased distance, the pedals being at a greater distance from the spindle *b* during the downstroke than during the upstroke. If the secondary cranks are, as I prefer, one-quarter of the length of the main crank, the pedals travel fifty per cent. faster and farther during a portion of the downstroke, the increased leverage being therefore twice that due to the eccentricity. During the downstroke it will be seen that the pedals overtake and pass the main crank and secondary crank-spindle end, but that the latter recover their lead during the upstroke.

In all the views the plane of greatest leverage is horizontal, but by engaging any particular teeth of the sun and planet wheels and by partially rotating the sun-wheels when slotted connections are used the plane of greatest leverage may be varied to such angle as may be found to be most advantageous according to the position of the saddle. The sun-wheels may be made to form part of the framework of the velocipede, and so give increased stiffness thereto.

What I claim as my invention, and desire to secure by Letters Patent, is—

In velocipede driving-gear, the combination with the main cranks, of secondary cranks mounted thereon provided with planet-wheels, and stationary externally-toothed sun-wheels with which said planet-wheels engage, said sun and planet wheels being of the same size, and pedals upon the secondary cranks.

In testimony whereof I have hereunto set my hand this 3d day of November, 1896.

GERALD BARKER.

Witnesses:

JOSEPH JER. TAYLOR,

THOMAS GEORGE BOCKING.