(No Model.) 2 Sheets—Sheet 1.

W. S. KELLOGG.

BICYCLE DRIVING GEAR.

No. 602,162. Patented Apr. 12, 1898.

Fig. 7.

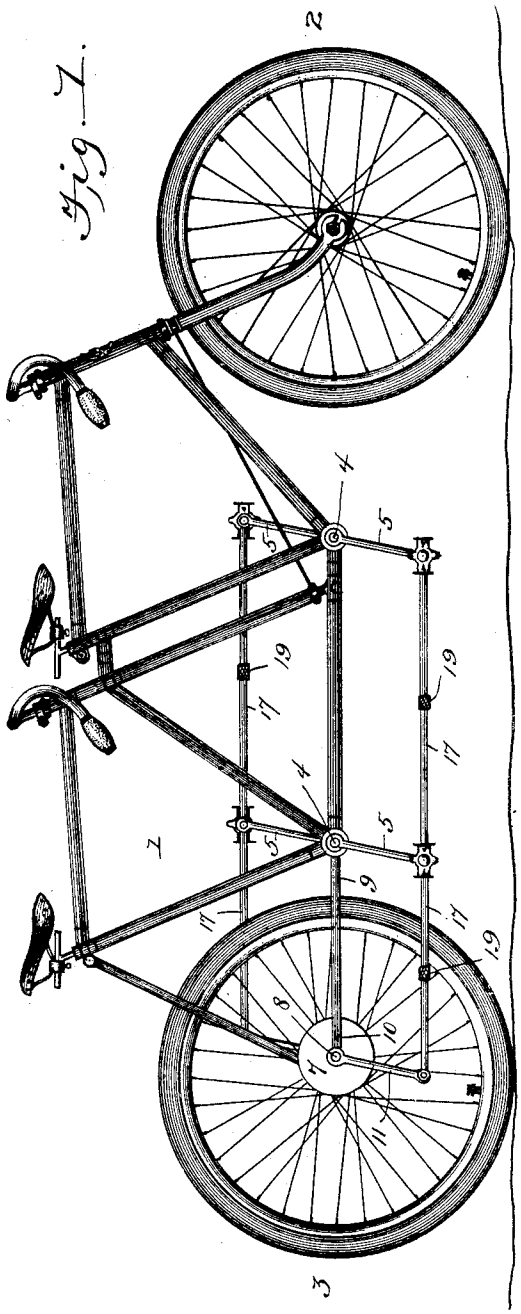


Fig. 9.

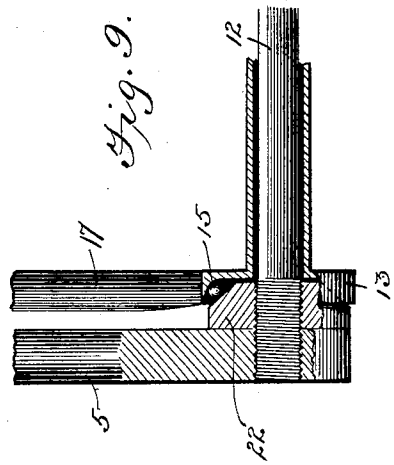
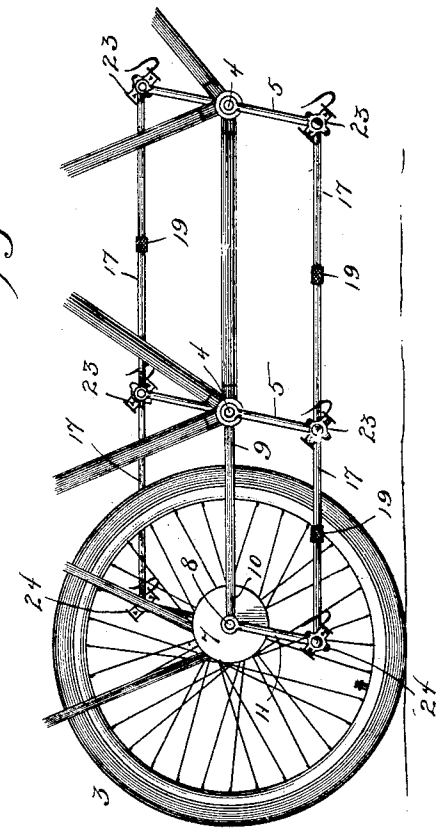


Fig. 8.



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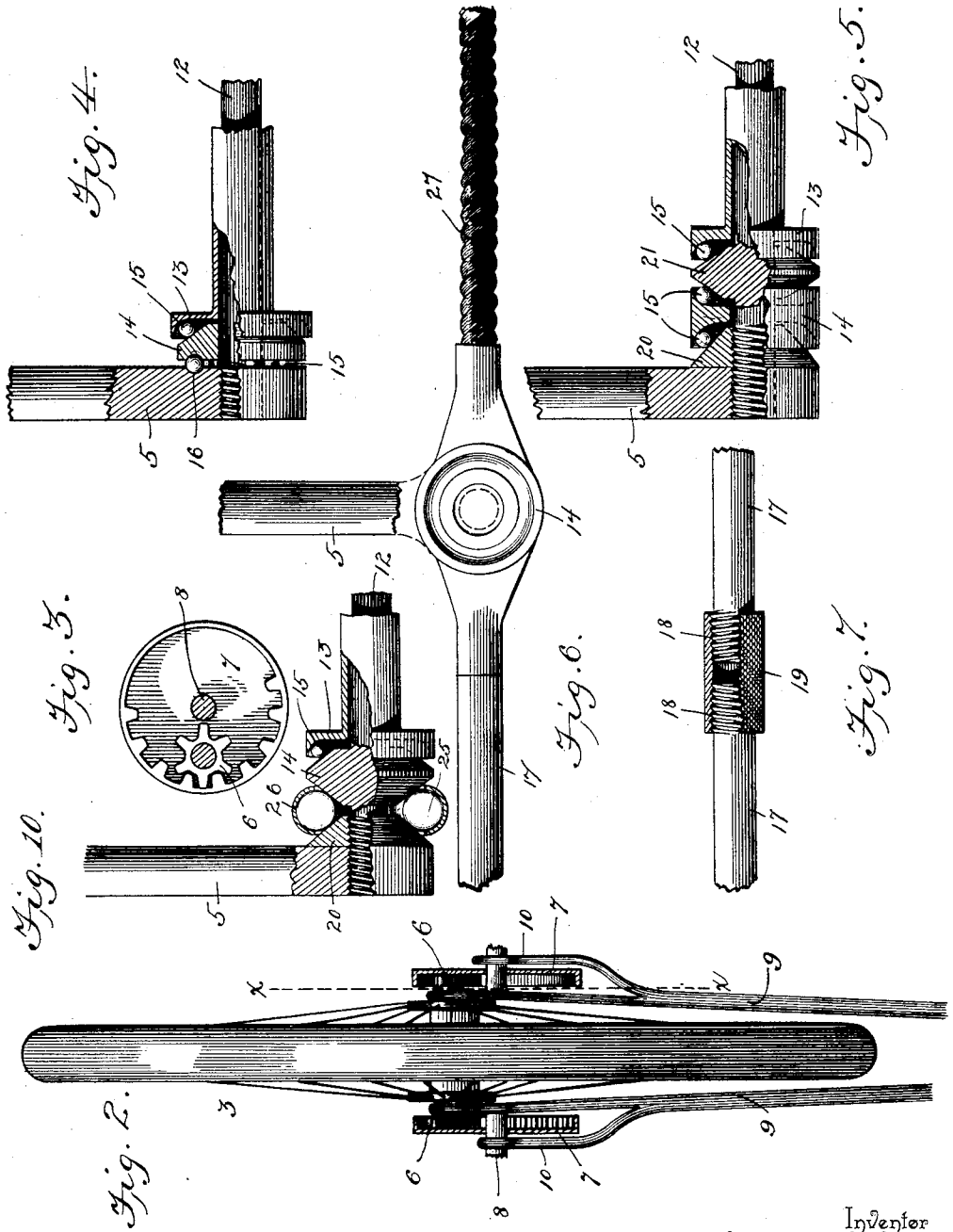
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(No Model.) 2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

WILLIAM SPARKS KELLOGG, OF LITTLE ROCK, ARKANSAS.

BICYCLE DRIVING-GEAR.

SPECIFICATION forming part of Letters Patent No. 602,162, dated April 12, 1898.

Application filed September 24, 1896. Serial No. 606,857. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM SPARKS KELLOGG, a citizen of the United States, residing at Little Rock, in the county of Pulaski and State of Arkansas, have invented a new and useful Bicycle Driving-Gear, of which the following is a specification.

This invention relates to the driving-gear of bicycles, either single or multiple; and the object in view is to dispense with the usual driving-chain between the crank-axle and driving-wheel and the excessive friction incident thereto and to substitute therefor connecting-rods interposed between the pedals or pedal-pins and extending rearward to cranks which are operatively connected to the driving-wheel. The improved driving-gear effects a coupling together of the several sets of cranks, so that they move simultaneously, and at the same time all lost motion is overcome and as a result greater steadiness imparted to the driving mechanism.

Other objects and advantages of the invention will appear in the course of the subjoined description.

The invention consists in an improved driving-gear for bicycles and similar vehicles embodying certain novel features and details of construction and arrangement of parts, as hereinafter fully described, illustrated in the drawings, and incorporated in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a tandem bicycle, showing the improved gear applied thereto. Fig. 2 is an enlarged detail plan view, partly in section, showing the method of speeding up. Fig. 3 is a detail section on the line x x of Fig. 2. Fig. 4 is a detail section, partly in elevation, showing the connection between the connecting-rod and the pedal-pin. Fig. 5 is a similar view showing a modified connection. Fig. 6 is a detail side elevation of the connection shown in Fig. 4. Fig. 7 is a detail section showing the manner of adjusting the length of the connecting-rod. Fig. 8 is a partial side elevation of a tandem bicycle with a form of driving-wheel especially adapted for racing. Fig. 9 is an enlarged detail section of the construction shown in Fig. 8, showing the connecting-rod attached fixedly to the inner end of the pedal. Fig. 10 is a detail similar to Fig. 4, showing a modified form of connection.

Similar numerals of reference designate corresponding parts in the several figures of the drawings.

The improved driving-gear forming the subject-matter of this invention may be utilized either upon single or tandem bicycles or multiple machines, but for the purpose of illustration is shown and will be described as applied to a tandem bicycle.

1 designates the frame of the tandem, which may be of any usual or preferred construction, 2 the front steering-wheel, and 3 the rear or driving wheel.

4 designates the crank-axles, and 5 the cranks.

6 designates a spur-pinion which is mounted fast on the hub or axle of the driving-wheel 3, one or two of said pinions being employed, as may be found most expedient, although but one of said pinions is deemed to be necessary.

7 represents an internal gear which surrounds and incloses the pinion 6 and meshes therewith, said internal gear being mounted upon a separate spindle 8, journaled in the bottom run 9 and also in a parallel extension 10 of said bottom run. This spindle 8 has fixed to its outer end a crank 11 of the same length as the crank 5, above referred to, and set at corresponding angles. Thus when motion is imparted to the crank 11 a higher speed will be imparted to the driving-wheel 3, such speed being governed by the relative number of teeth of the gear 7 and pinion 6.

In the event two pinions 6 are used, one on each end of the axle of the driving-wheel, two internal gears 7 will also be used, and each gear will be similarly mounted on the frame and provided with a crank 11; but these cranks will be oppositely arranged.

Referring to Fig. 4, 12 designates one of the pedal-pins, which is screwed at its inner end into the crank 5. Adjacent to its inner end each of the pedals is provided with a ball-cup 13, and between such ball-cup and the crank 5 is located a revoluble cone 14, mounted loosely on the pedal-pin 12 and provided at each side with ball-races in which two sets of antifriction-balls 15 travel, the

inner set traveling also in an annular ball-race 16 in the outer surface of the crank 5.

The construction above described is the same with respect to each crank and pedal, and the revoluble cones 14 of corresponding pedals on each side of the machine are connected by a tubular rod 17, the opposite ends of which are welded or otherwise rigidly secured to said cones. Each of the connecting-rods 17 is divided intermediate its ends and provided with right and left hand threads 18 for the reception of a turnbuckle 19, by the adjustment of which each connecting-rod may be lengthened or shortened to suit the space between the pedals and to prevent lost motion by taking up wear.

By means of the construction described it will be seen that all of the cranks are coupled together, including the cranks on the spindle of the internal gear 7, thereby insuring the equal and simultaneous movement of all of the pedals.

In Fig. 5 a slight modification in the form of the connection is shown, the same consisting in providing a cone 20 on the outer surface of each crank 5 and a second cone 21, fast on the pedal-pin 12, near the inner end of the latter. A series of balls is located between the cone 21 and ball-cup 13 of the pedal, and the part 14, above described as a cone, is transformed into a double ball-cup, so that two series of antifriction-balls 15 may be interposed between it and the cones 20 and 21. The connecting-rod 17 is attached rigidly to to said double ball-cup in the same manner as described in connection with the cone 14.

In racing-machines it is desirable to hold the pedals at a fixed angle, and this may be done in a very simple manner by attaching the connecting-rod 17 rigidly and directly to the inner ball-cup of the pedal after having first set the pedal at the proper pitch. In this event an outwardly-extending cone 22 is placed upon the crank 5 for affording the necessary clearance between said crank and the connecting-rod 17. In this manner all of the pedals (indicated at 23) are held at all times at the same angles, as clearly shown in Fig. 8, and, if desired, an additional set of pedals 24 may be used upon the rear set of cranks 11 and a third seat arranged thereover for an additional rider.

In Fig. 10 a slight modification is shown, which consists in making the cone 14 double-faced and placing large balls 20 between it and the cone 21. An annular bearing-collar 26, of concavo-convex shape in cross-section, surrounds the balls 25 and is united to the connecting-rod 17. In lieu of the rod 17 a rope or other flexible connection 27 may be employed. In order to reduce friction, the internal gears 7 may be mutilated, or some of the teeth may be omitted, as shown in Fig. 3, so that while the teeth of the gear 7 on one side of the machine are meshing with the adjacent pinion 6 the pinion on the other side of the machine will be out of mesh. The teeth in each gear 7 extend a little more than half-way around, so that one or the other of the pinions will always be in mesh.

The construction above described affords a very simple and desirable driving-gear for single or multiple machines, gets rid of the usual driving-chain and its friction, and entirely obviates lost motion.

It will be understood that the gearing is susceptible of changes in the form, proportion, and minor details of construction, which may accordingly be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed as new is—

1. In a bicycle, the driving-wheel axle carrying a pinion at its outer end, an internal gear journaled on the frame to mesh with said pinion, a crank rigid on the gear and a pedal-crank, combined with a revoluble member of a ball-race on the pedal-pin and the wrist-pin of the gear-crank respectively, the other members of the respective races being on the cranks, balls in each of the races, and a rod connecting the revoluble members of the ball-races, substantially as described.

2. In a bicycle, the driving-wheel carrying at each side a fixed spur-pinion, in combination with internal gears meshing therewith and each having a portion of its teeth cut away as described, cranks rigid on said gears, and operative connections between said cranks and similar cranks on the crank-axle, said connections having a ball-bearing engagement with the pedal-pins of the driving-cranks at the inner ends of the pedals, 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.

WILLIAM SPARKS KELLOGG.

Witnesses:

J. KELLOGG,

E. HAUGGI.