

No. 616,744.

**W. H. SYMONDS.**

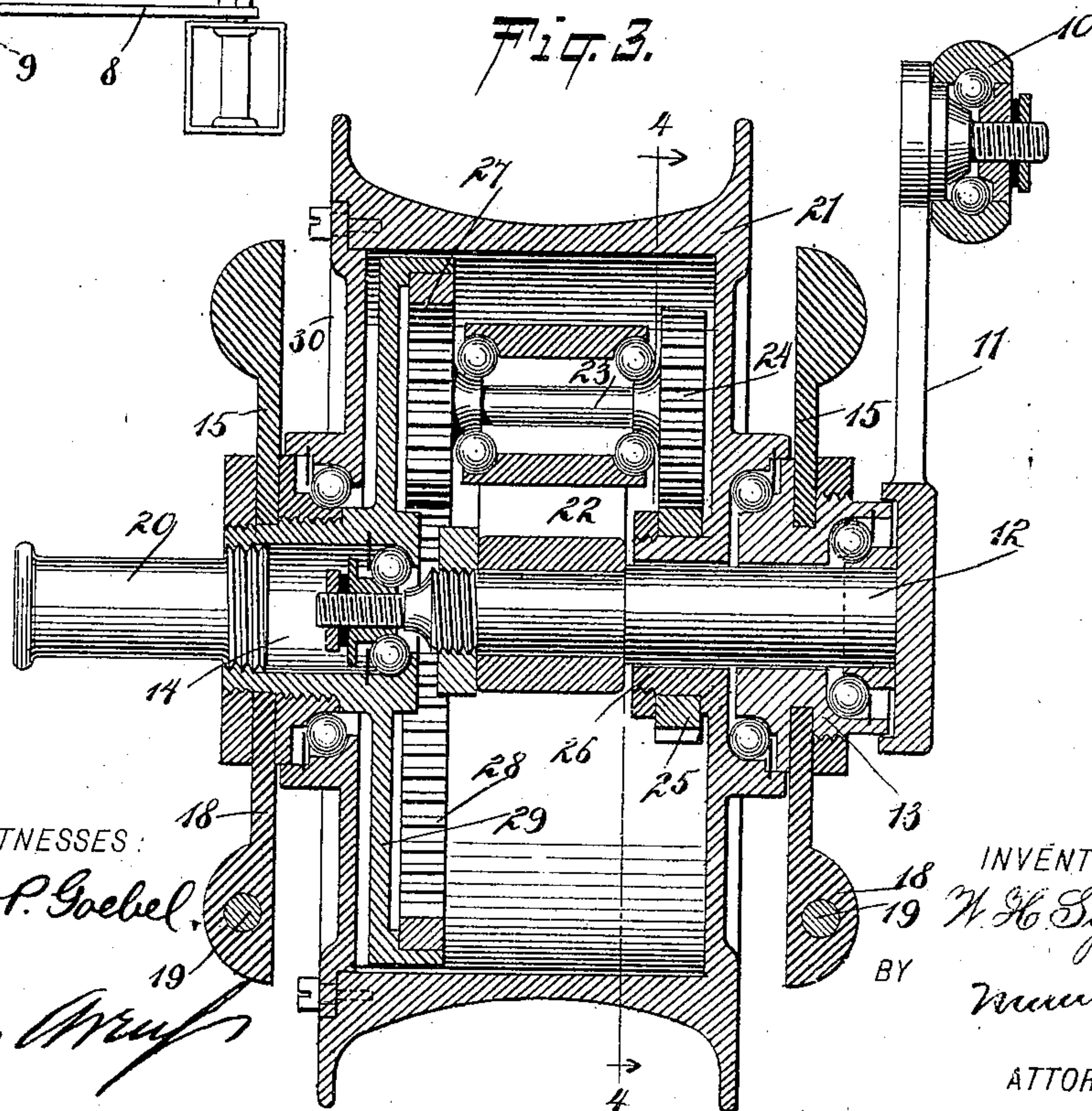
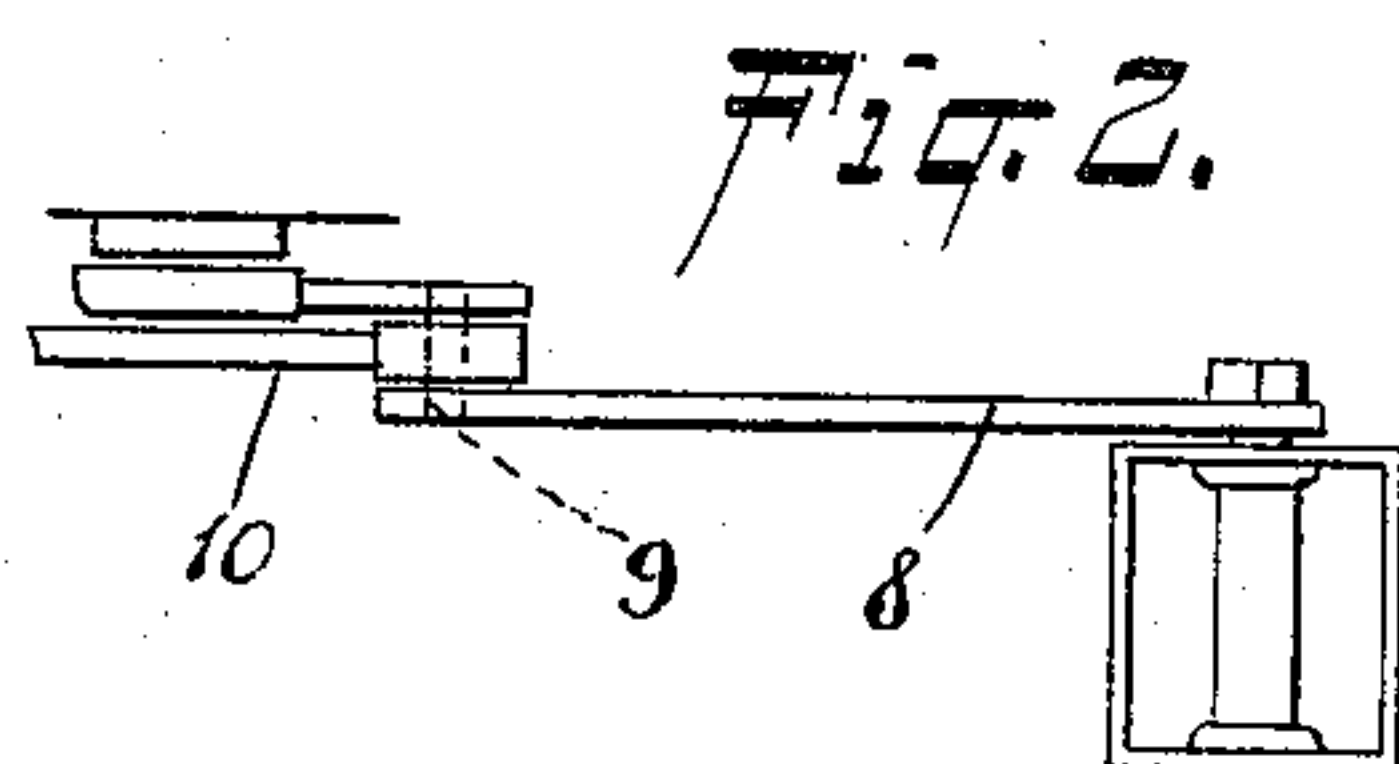
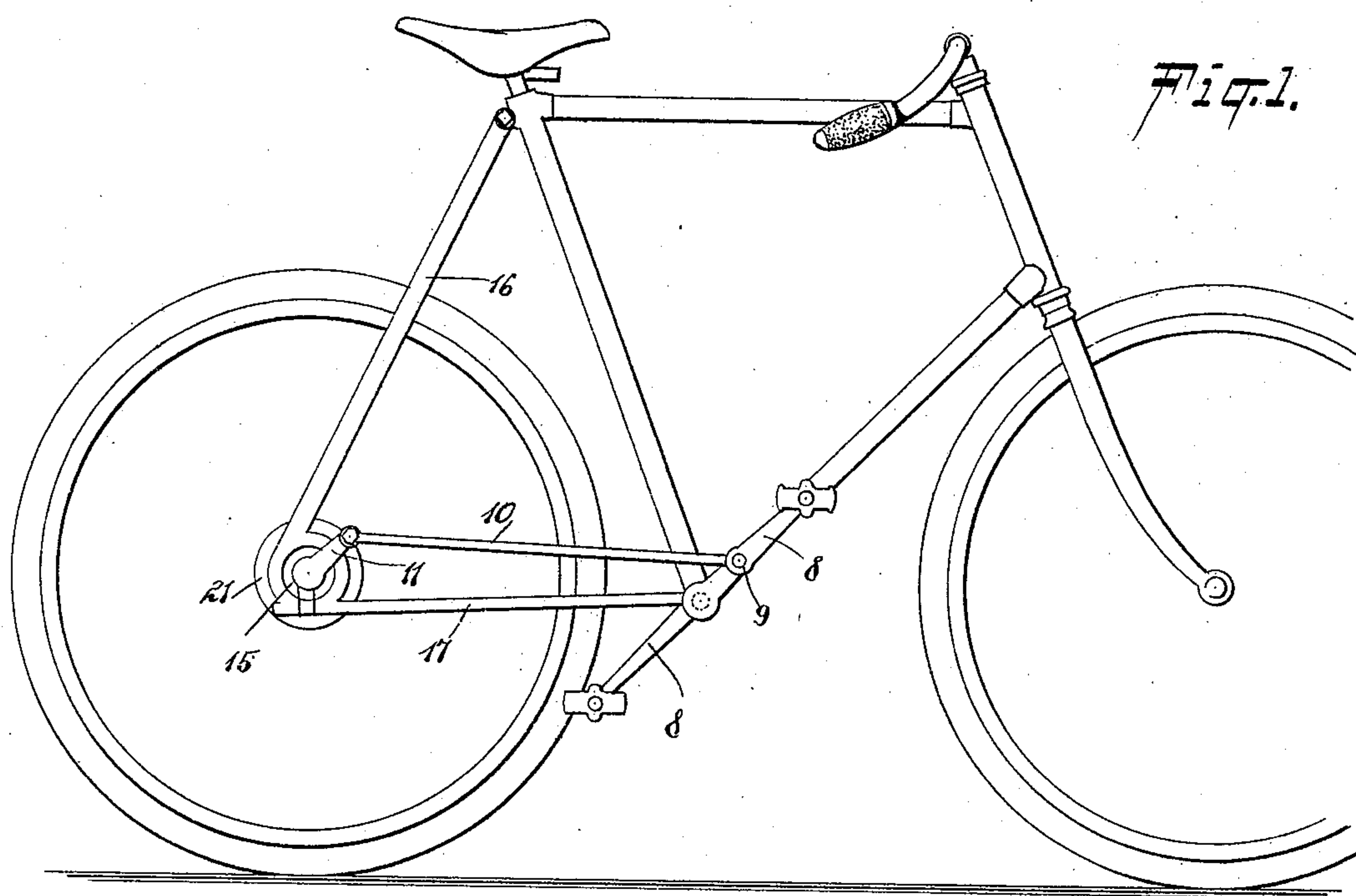
**Patented Dec. 27, 1898.**

## BICYCLE GEAR.

(Application filed Nov. 13, 1897.)

(No Model.)

**2 Sheets—Sheet 1.**



WITNESSES :

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19  
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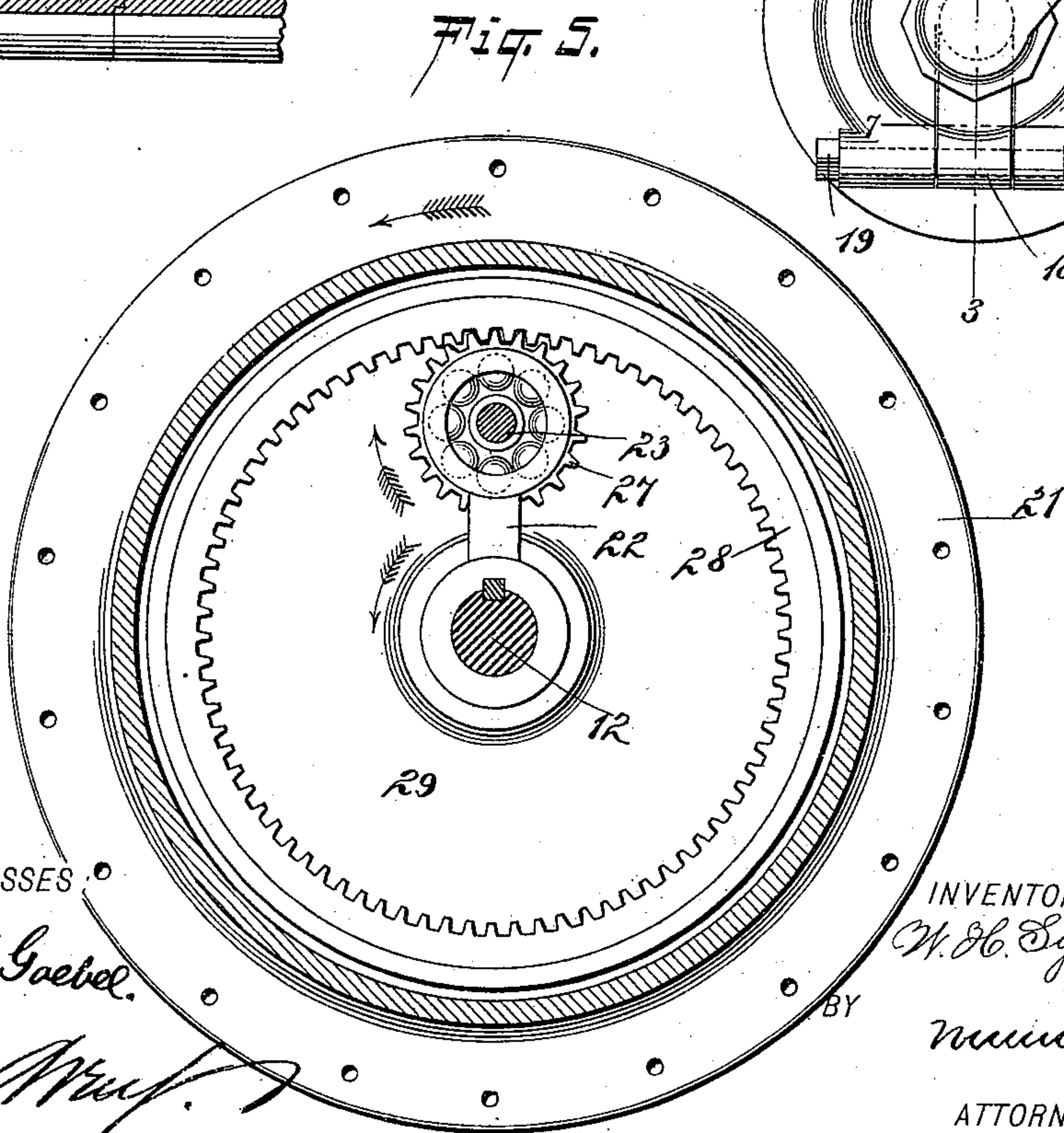
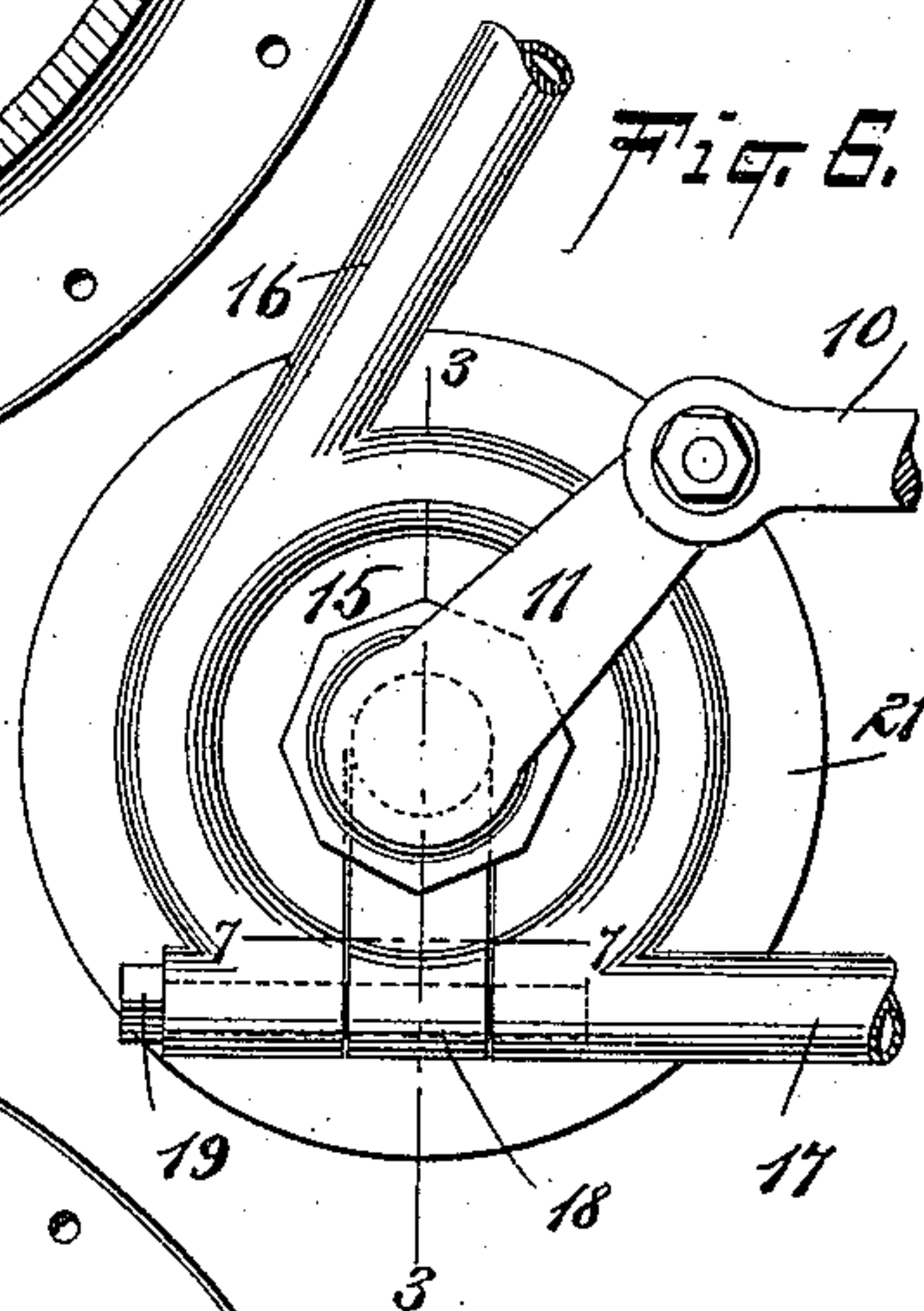
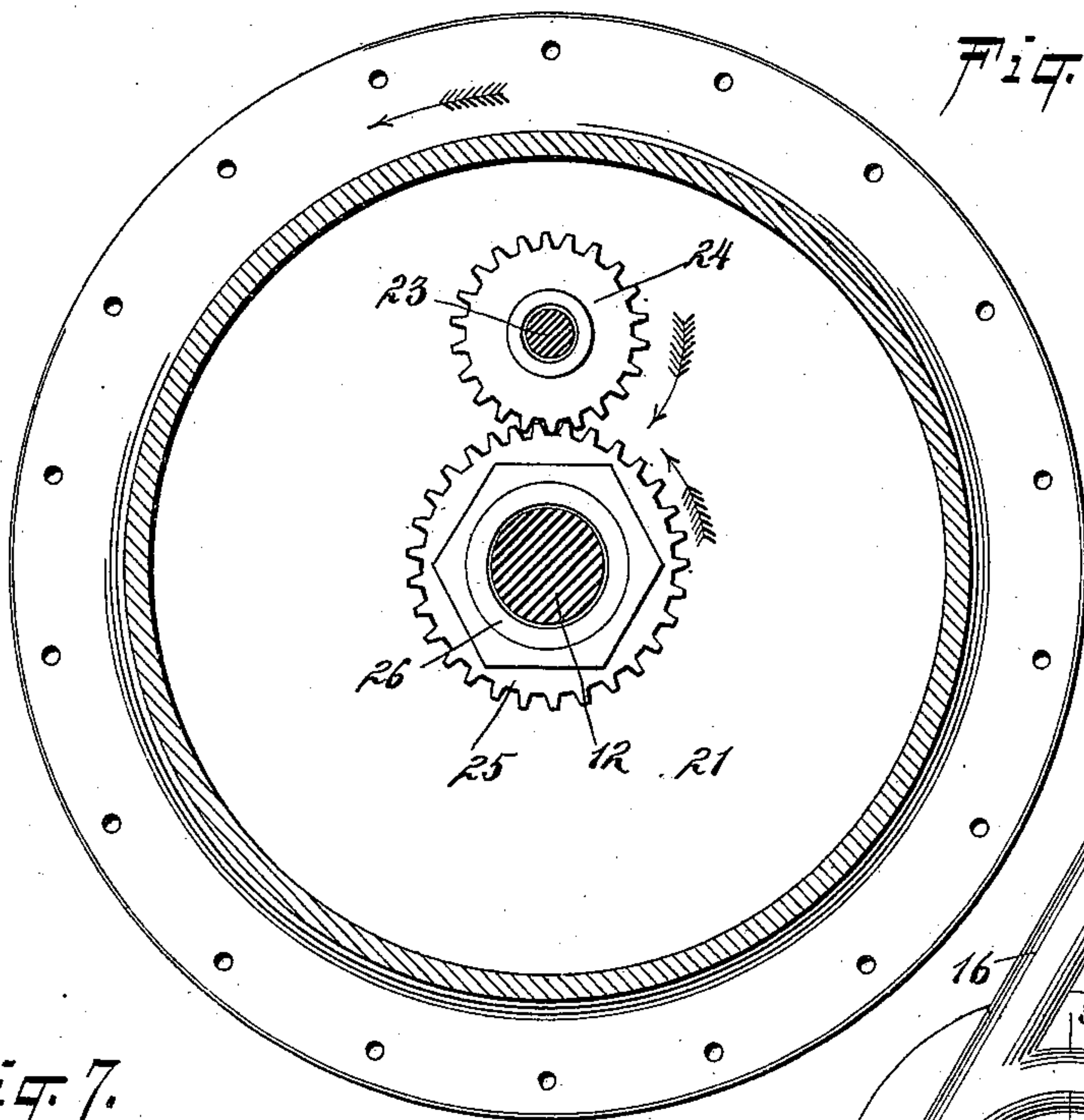
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## BICYCLE GEAR.

(Application filed Nov. 13, 1897.)

(No Model.)

**2 Sheets—Sheet 2.**



WITNESSES

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# UNITED STATES PATENT OFFICE.

WILLIAM H. SYMONDS, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO  
EUGENE JEPSON, OF SAME PLACE.

## BICYCLE-GEAR.

SPECIFICATION forming part of Letters Patent No. 616,744, dated December 27, 1898.

Application filed November 13, 1897. Serial No. 658,414. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. SYMONDS, of New York city, in the county and State of New York, have invented a new and Improved Bicycle-Gear, of which the following is a full, clear, and exact description.

This invention is a bicycle-gear in which the driving or traction wheel is turned by a crank-and-link movement from the crank or primary movement shaft; and the invention embodies a link or pitman attached to one of the pedal-cranks and running to a crank on a shaft axially coincident to the traction-wheel, such shaft having a novel multiplying-gear by which the traction-wheel is driven at the requisite speed.

The invention consists in the particular construction and combination of parts, as hereinafter described, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the invention. Fig. 2 is a plan view of one of the pedal-cranks and the links attached thereto. Fig. 3 is a vertical section taken through the hub of the traction-wheel on the line 3 3 of Fig. 6. Fig. 4 is a sectional view on the line 4 4 of Fig. 3, the line of vision being in the direction of the arrows indicated on said line. Fig. 5 is a sectional view on the line 4 4 of Fig. 3, the view being taken in the direction opposite to the arrows indicated on said line. Fig. 6 is a side elevation of the hub of the traction-wheel and the framing adjacent thereto, and Fig. 7 is a detail section on the line 7 7 of Fig. 6.

Cranks 8 are mounted, as usual, on the crank-shaft. One of the cranks 8 is formed in two sections rigidly connected by a wrist-pin 9. Connected with this wrist-pin is a pitman 10, which runs rearward and has connection with a wrist-pin on a crank 11, fast on a shaft 12, which in turn is journaled at its right-hand or outer end in a box 13 and at its left-hand or inner end in a box 14. The boxes 13 and 14 are respectively held rigidly by two plates 15, forming part of and rigidly connected with the rear upper braces 16 and rear lower braces 17. The boxes 13 and 14 are held in the plates 15 by means of panels 18, that form

part of the plates 15, but which are separate therefrom and held rigidly in position by bolts 19, run horizontally and tangentially with reference to the circular plate 15. The panels 18 are moved vertically in and out of position and are shaped so that when the panels are in position the regular continuity of the plates will not be broken. The panels 18 bear against the lower portions of the boxes 13 and 14 to firmly support the boxes. The box 14 has a step 20 screwed thereinto, by which step persons may mount the bicycle.

Mounted to turn on the boxes 13 and 14 and between said boxes is the hub 21 of the traction-wheel. The shaft 12 carries a crank-arm 22, which swings with the shaft through the hollow hub 21. The crank-arm 22 loosely carries a shaft 23, to one end of which is fixed a pinion 24, meshed with a pinion 25, fast on a boss 26 of the hub 21, the pinion 25 being concentric to the shaft 12. The opposite end of the shaft 23 has a pinion 27, meshing with an internal cog-rim 28, formed on a disk 29, which in turn is rigidly secured to or forms a part of the box 14 and which is located within the hollow hub 21. As the shaft 12 turns the arm 22 swings the shaft 23 around the cog-rim 28, whereupon the shaft 23 is driven and rotary movement is imparted to the hub 21 through the action of the gears 24 and 25. By these means the rotary movement of the shaft 12 is transmitted to the traction-wheel and multiplied in transmission. The hub 21 has a removable end or head 30, by which the interior of the hub may be reached, and by changing the gears the speed at which the traction-wheel is driven from the shaft 12 may easily be regulated.

The various mobile parts are mounted to run on ball or other antifriction bearings, as shown in the drawings, and such bearings may be provided with felt packing or gaskets to produce a dust-tight arrangement.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a bicycle, the combination with the frame thereof comprising two rigid plates, of a box held rigidly in each plate, a crank-shaft mounted to turn in the boxes, a hollow hub inclosing portions of the boxes and turning



on the same with an axis coincident to that of the crank-shaft, a disk inclosed by the hub and fixedly carried on one of the boxes, the disk being provided with an internal cog-rim, an arm fixed to and turning with the crank-shaft and inclosed by the hub, a shaft mounted loose in the arm, a pinion fixed to the shaft of the arm and meshed with the cog-rim to drive the shaft of the arm, a second pinion fixed to the shaft of the arm, and a third pinion meshed with the second pinion and fast on the hub and axially coincident thereto.

2. In a bicycle, the combination of a wheel-hub provided with an inwardly-projecting boss having a pinion thereon, a fixed internally-toothed rim, a crank-shaft, an arm on the crank-shaft within the hub between the pinion thereof and the toothed rim, and pinions loosely mounted in the end of the arm, one pinion meshing with the pinion of the boss of the wheel-hub and the other with the toothed rim, substantially as described.

3. In a bicycle-gear, the combination with the rear braces, and plates carried thereby, of boxes held in said plates, a crank-shaft mounted to turn in the boxes, a wheel-hub mounted to turn on the boxes and provided with an inwardly-projecting boss, a disk secured to one of the boxes within the hub and provided with an internal toothed rim the disk being of a diameter approximately equal to the internal diameter of the wheel-hub, a pinion secured on the boss of the wheel-hub, an arm secured to the crank-shaft, a shaft loosely mounted in the free end of the arm, a pinion on one end of the shaft meshing with the pinion on the hub, and a pinion on the other end of the said shaft and meshing with the internal toothed rim of the disk carried by the hub, substantially as described.

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Witnesses:

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