No. 773,227. PATENTED OCT. 25, 1904.

W. J. ROBINSON.

SPEED GEAR.

APPLICATION FILED NOV. 21, 1902.

NO MODEL. 2 SHEETS—SHEET 1

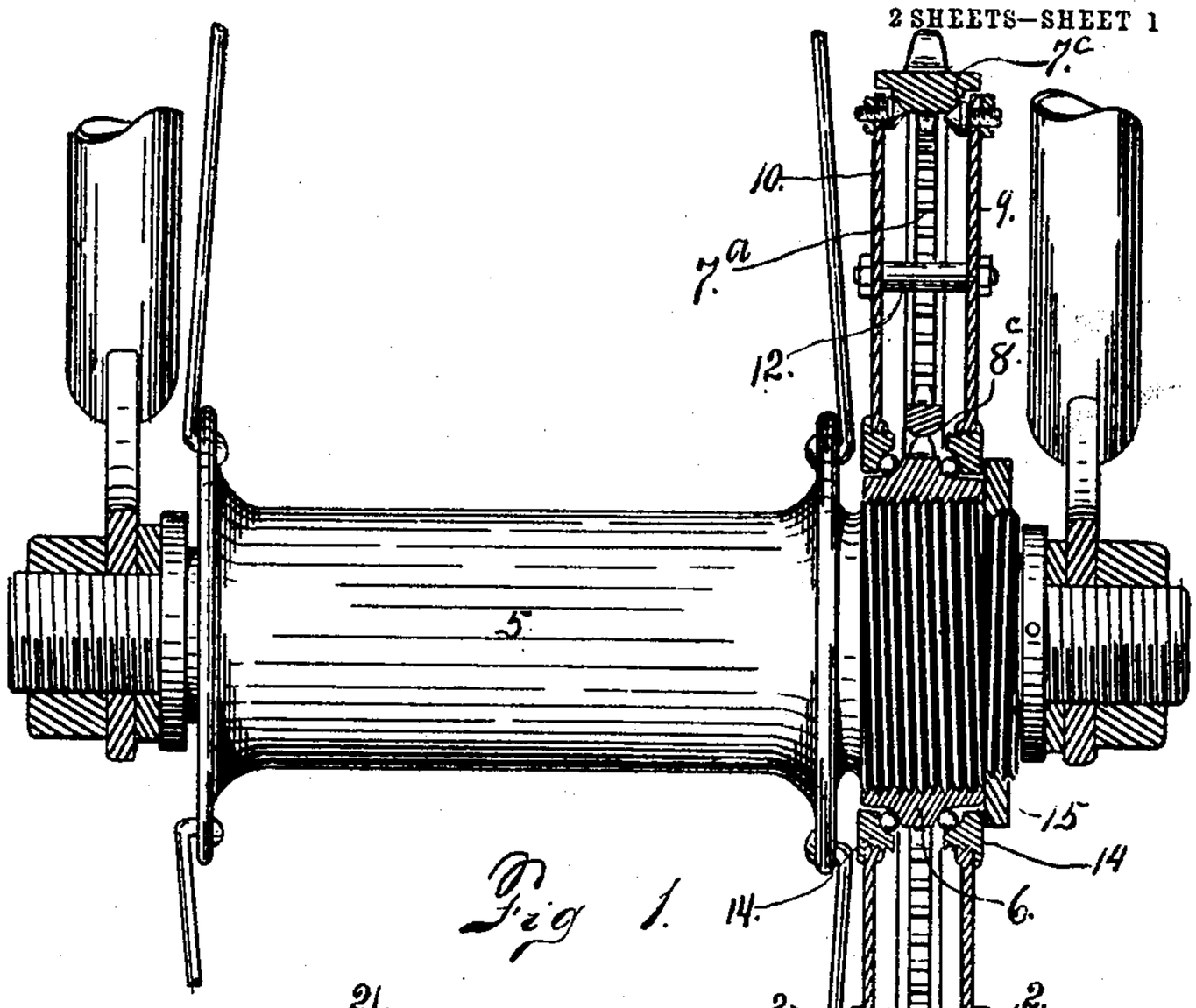


Fig. 1.

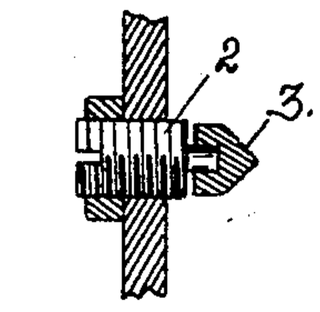


Fig. 3.

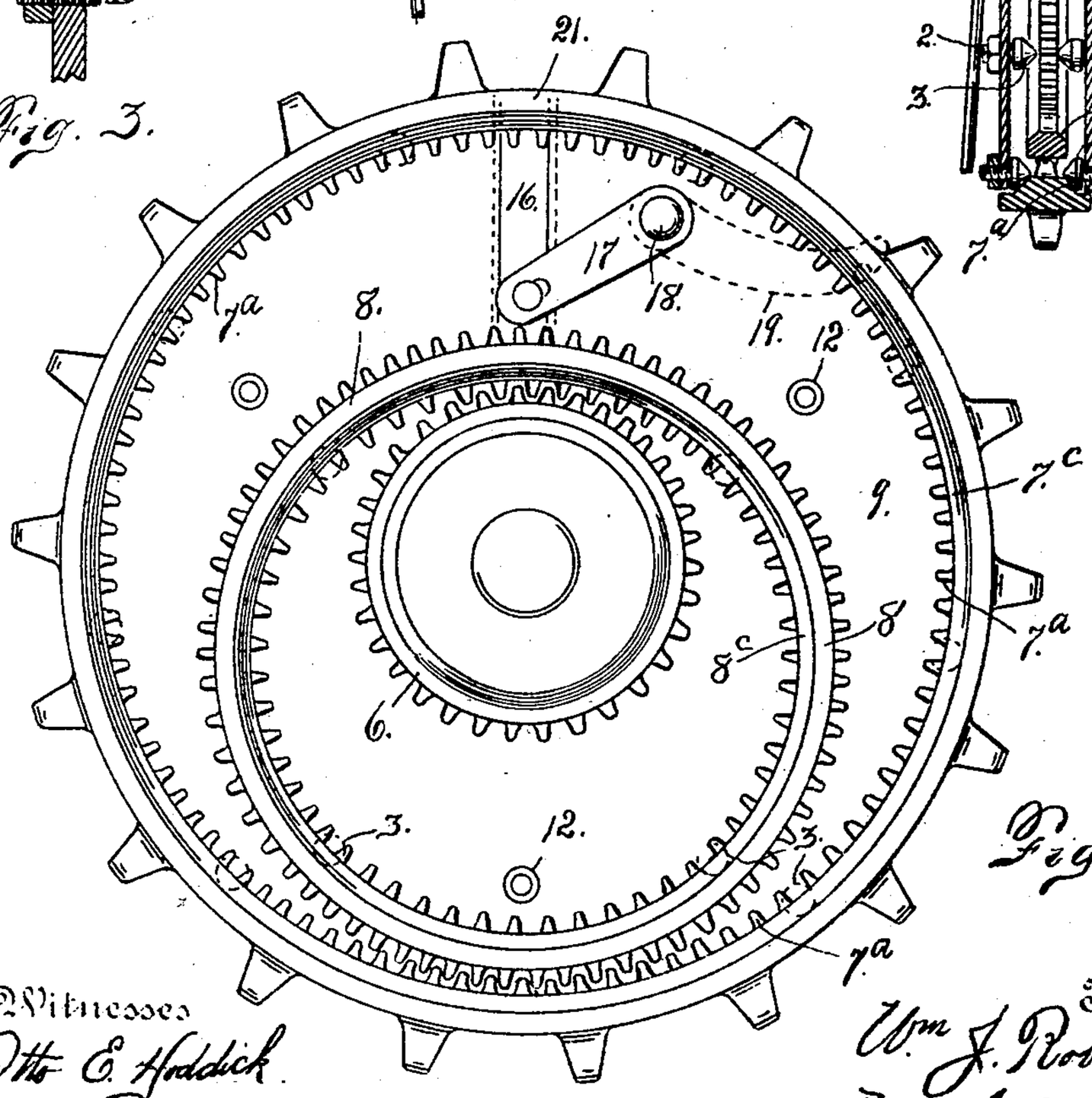


Fig. 2.

Witnesses
Otto E. Hoddick.
Dena Nelson.

Inventor
Wm J. Robinson
By F. F. Dodge
Attorney

No. 773,227. PATENTED OCT. 25, 1904.

# W. J. ROBINSON.

## SPEED GEAR.

APPLICATION FILED NOV. 21, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

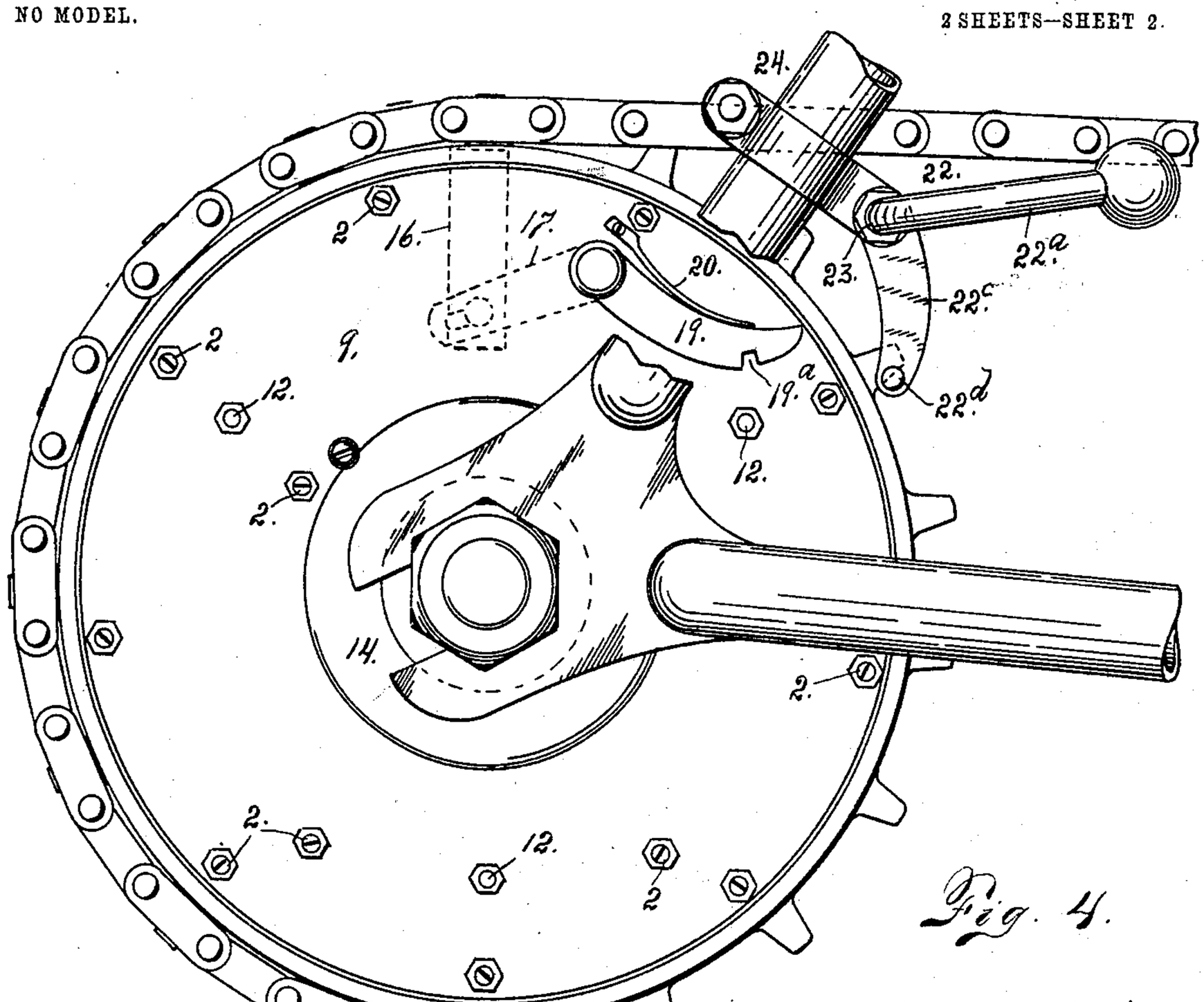


Fig. 4.

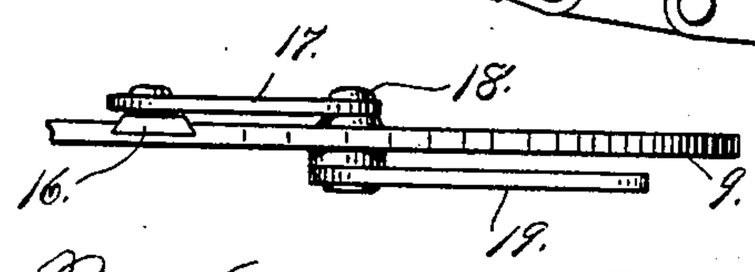


Fig. 6.

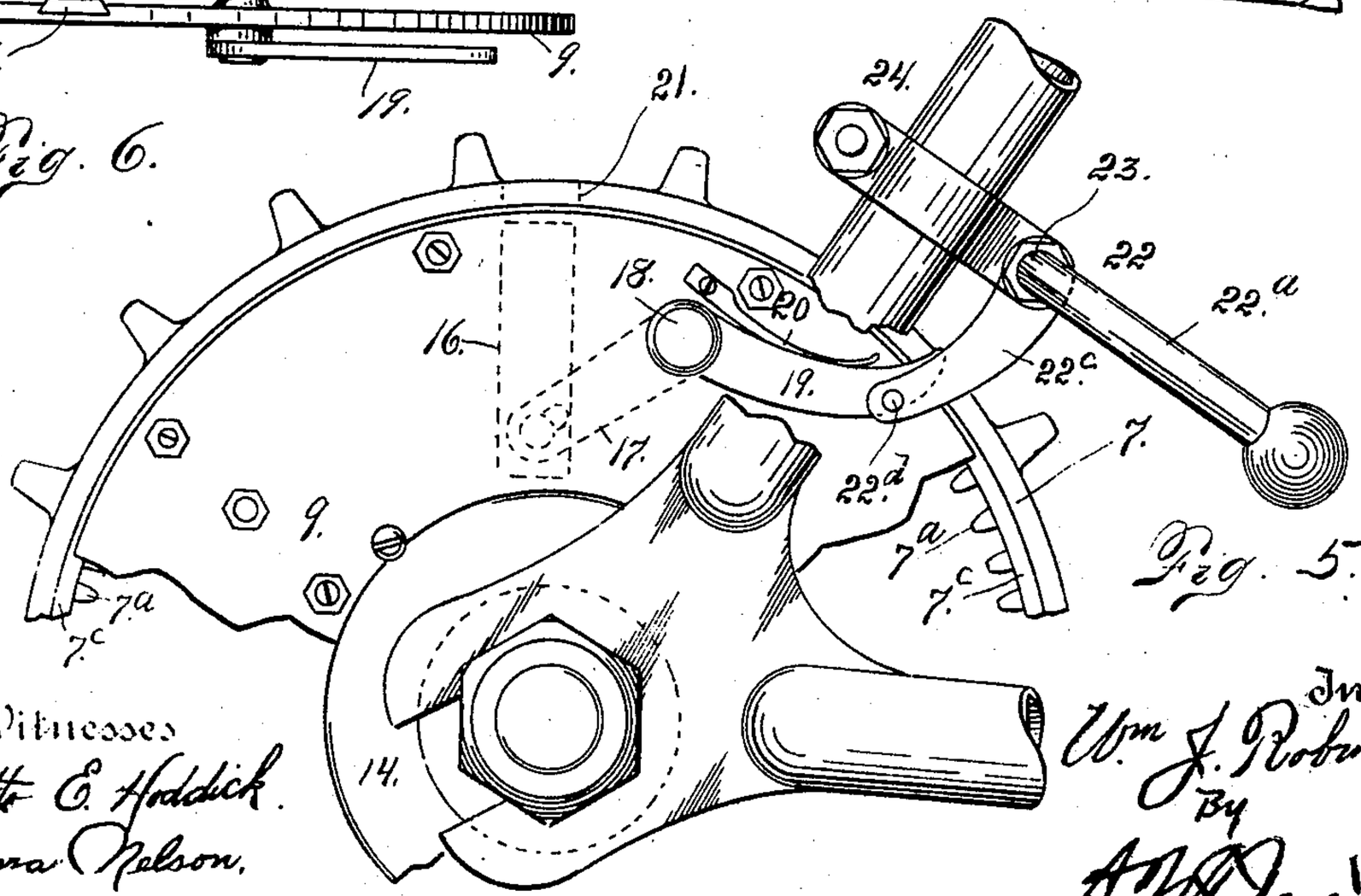


Fig. 5.

Witnesses
Otto E. Hoddick.
Dena Nelson.

Inventor
Wm J. Robinson
By
Attorney

No. 773,227. Patented October 25, 1904.

# UNITED STATES PATENT OFFICE.

WILLIAM J. ROBINSON, OF DENVER, COLORADO.

## SPEED-GEAR.

SPECIFICATION forming part of Letters Patent No. 773,227, dated October 25, 1904.

Application filed November 21, 1902. Serial No. 132,324. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM J. ROBINSON, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Speed-Gears; and I do 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, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in changeable speed-gears, and while more especially intended for use on bicycles and other velocipedes it may be employed to advantage in other relations.

In this specification the device will be described in connection with its use on bicycles, and in this relation it is substituted for the rear sprocket of a chain-propelled machine.

I will now proceed to describe the same in detail, reference being made to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 shows my improved gearing applied to the rear hub of a bicycle-wheel, the gearing being shown in section. Fig. 2 is a side view, one plate of the casing being removed and the rear axle shown in elevation, the bicycle-frame being omitted. Fig. 3 is a detail view of one of the conical side bearings mounted on the casing and engaging the gears. Fig. 4 is a side elevation showing the gearing applied and with the controlling mechanism in the normal position, whereby the machine is running at low normal speed. Fig. 5 is a similar fragmentary view showing the controlling mechanism adjusted to cause the gears to rotate while the casing remains relatively stationary, thus giving the machine a relatively high speed. Fig. 6 is a fragmentary section taken through one of the casing-plates, illustrating certain features of the controlling mechanism which are mounted thereon.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate the hub of the bicycle-wheel, upon one extremity of which is screwed the small gear or pinion 6, which is concentric with the sprocket-rim, the latter being interiorly cogged, as shown at $7^a$. The eccentric gear 8 is cogged both interiorly and exteriorly, its inner cogs meshing with the gear 6 and its exterior cogs meshing with the cogs $7^a$ of the sprocket-gear. To the opposite sides of the gears 7 and 8 are applied two plates (designated 9 and 10, respectively) which are connected by shouldered pins 12, whereby the plates are spaced or kept at a uniform distance apart. The extremities of these pins protrude through the plates and are fastened by nuts or other suitable means, whereby the parts are held in operative position when assembled. Into threaded openings formed in the plates 9 and 10 around and adjacent the rims of the gears 7 and 8 are screwed studs 2, upon whose inner extremities, which are reduced and shouldered for the purpose, (see Fig. 3,) are mounted revoluble conical bearings 3, which engage the rims of the gears 7 and 8, the latter being beveled, as shown at $7^c$ and $8^c$, respectively, to conform to the engaging surface of the conical bearings. Into the casing-plates adjacent the hub of the gear 6, which hub forms a double cone, are screwed ball-cups 14, between which and the cones of the hub are located the ball-bearings 15. The gear 6 is held in place by an exterior lock-nut screwed upon the wheel-hub.

Mounted on the casing-plate 9, as shown in the drawings, and engaging a dovetailed groove therein (see Fig. 6) is a locking-slide 16, connected with the outer extremity of an arm 17, whose inner extremity is made fast to a stud 18, journaled in the casing-plate 9. The parts 17 and 18 are located within the casing. To the outer extremity of the stud 18 is made fast a lever-arm 19, which is exteriorly located and engaged by a leaf-spring 20, which is mounted on the casing and normally acts to throw the slide 16 into an opening 21, formed in the sprocket-rim, whereby the casing and gears are made to rotate in unison. In this event the parts 6, 7, and 8 rotate together and there is no relative or independent movement of any of these parts. If it is desired to increase

the speed of the bicycle or make the wheel-hub 5 rotate more than once for each rotation of the sprocket 7, the parts 16, 17, and 19 are actuated to disengage the slide 16 from the sprocket-rim or throw the slide into the position indicated in Fig. 5. This may be accomplished by any suitable mechanism. As shown in the drawings, a sort of bell-crank lever 22, fulcrumed on the bicycle-frame 24, (shown at 23,) is employed. This may be actuated by the foot of the rider. As the arm $22^a$ is thrown downwardly the arm $22^c$ is made to engage the lever-arm 19, the latter being thrown upwardly, whereby the downward movement is imparted to the arm 17, withdrawing the slide 16 from the sprocket-rim. The arm $22^c$ is provided with a pin or stud $22^d$, which engages the notch $19^a$, formed in the arm 19, and locks the parts in the adjusted position. At the fulcrumed point the bell-crank-lever bearing is sufficiently tight or closed to cause the lever to normally remain in any desired position of adjustment. As long as the bell-crank lever engages the arm 19 the slide 16 is withheld from the sprocket-rim and the casing is held against rotation. Hence the sprocket 7 rotates in the casing and actuates the eccentric 8, and the latter in turn operates the gear 16.

The speed of the machine will of course depend upon the relative size of the gears 6, 7, and 8. If the cogged periphery of the gear 7 is twice the circumference of the wheel 8 and the latter wheel is twice the circumference of the wheel 6, the gear 6 or the bicycle-wheel will rotate four times for every rotation of the sprocket. This relative movement may, however, be regulated as desired by constructing the gears of the proper relative size.

Having thus described my invention, what I claim is—

1. In a gear for velocipedes, the combination with a suitable frame and a wheel thereof of a small gear fast on the hub of the wheel, a spokeless sprocket-rim concentric with the small gear and interiorly cogged, a spokeless gear eccentric with the other gears, and interiorly and exteriorly cogged to mesh with both, the eccentric gear surrounding the small gear and the sprocket-rim surrounding both gears, a casing forming a bearing for the sprocket-rim and the eccentric gear, a slide mounted on the casing and capable of adjustment to enter an opening formed in the rim of the sprocket to lock the casing and sprocket together, a spring-held device mounted on the casing and connected with the slide to normally hold the latter in engagement with the opening in the rim of the sprocket, and means mounted on the framework of the machine and engaging the spring-held device, whereby the latter may be actuated in opposition to its spring, whereby the slide is disconnected from the sprocket, substantially as described.

2. In a gear for velocipedes, the combination with the frame of the machine and a wheel thereof of a small gear mounted to turn with the said wheel, a spokeless sprocket-rim concentric with the small gear and interiorly cogged, a spokeless gear eccentric with the other gears and interiorly and exteriorly cogged to mesh with both, the eccentric gear surrounding the small gear and the sprocket-rim surrounding both of the other gears, a casing forming a bearing for the sprocket-rim and the eccentric gear, a slide mounted on the casing and capable of adjustment to enter an opening or recess formed in the sprocket-rim to lock the casing and sprocket together, an arm pivotally mounted with the slide at one extremity, a stud journaled in the casing and to which the opposite extremity of the said arm is made fast, another arm made fast to the said stud and exteriorly located, a spring acting on the last-named arm to hold the slide in engagement with the opening in the rim of the sprocket, and a bell-crank lever mounted on the frame of the machine and arranged to act on the spring-held arm and disconnect the slide from the sprocket-rim, the bell-crank having a pin engaging a notch of the spring-held arm for holding the parts in the adjusted position.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM J. ROBINSON.

Witnesses:
A. J. O'Brien,
Dena Nelson.