

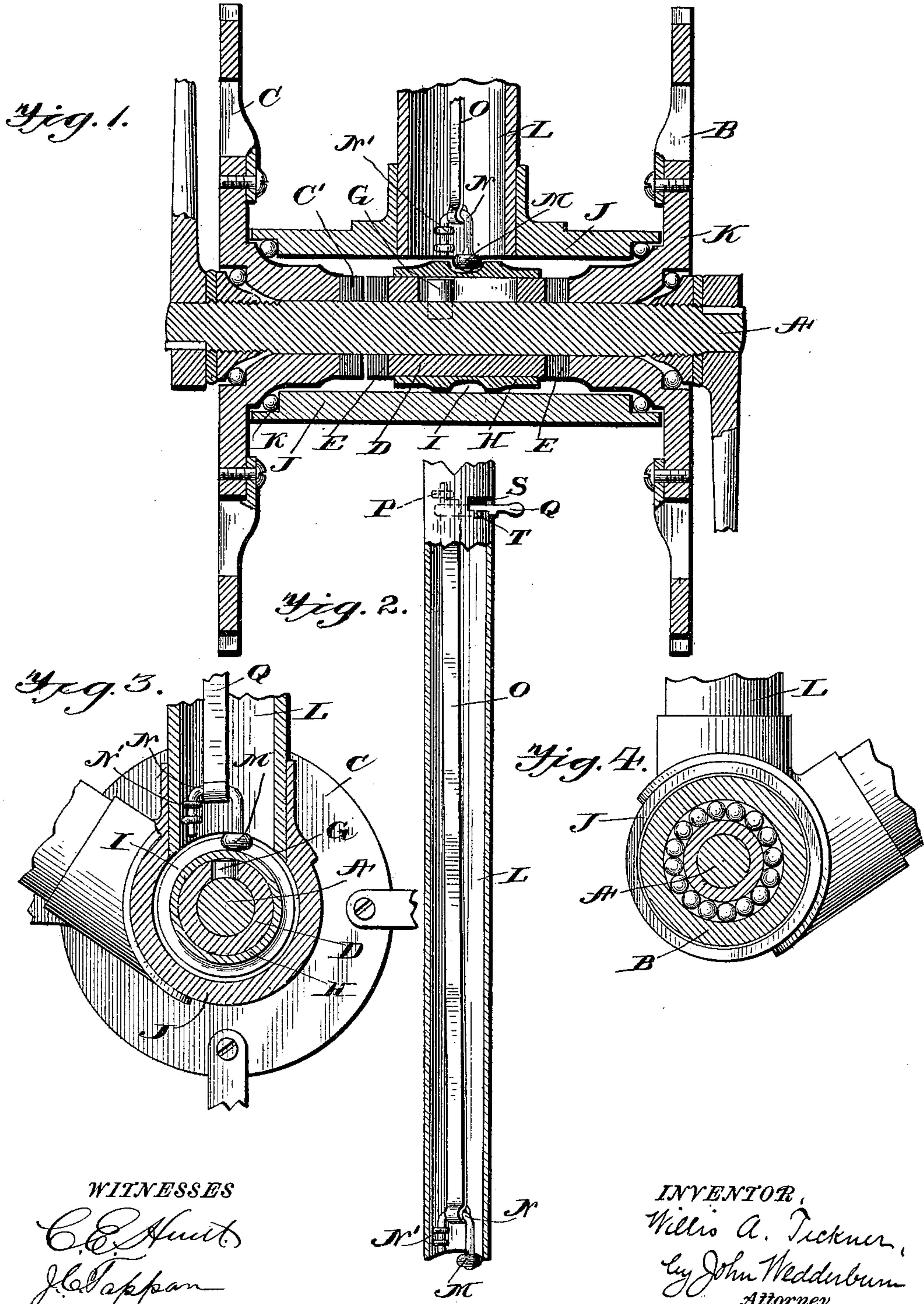
**No. 620,060.**

**Patented Feb. 21, 1899.**

**W. A. TICKNER.**  
**BICYCLE GEARING.**

(Application filed Sept. 9, 1896.)

(No Model.)



**WITNESSES**

C. C. Hunt.  
J. H. Tappan

*INVENTOR.*

Willis A. Tickner,  
by John Wedderburn  
Attorney



# UNITED STATES PATENT OFFICE.

WILLIS A. TICKNER, OF MARSHALL, WASHINGTON.

## BICYCLE-GEARING.

SPECIFICATION forming part of Letters Patent No. 620,060, dated February 21, 1899.

Application filed September 9, 1896. Serial No. 605,283. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIS A. TICKNER, a citizen of the United States, residing at Marshall, in the county of Spokane and State of Washington, have invented certain new and useful Improvements in Bicycle-Gearing; and I do hereby 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.

This invention relates to certain new and useful improvements in bicycle-gearing; and it has for its object, among others, to provide a simple and cheap construction of changeable gearing of that class in which provision is made for the changing of the gear without stopping the machine or getting off of the saddle. I aim to improve upon this class of mechanism, to the end that the gearing shall be protected from the dust and dirt and at the same time the rider is also protected. The durability of the machine is increased, and as the wear is distributed upon the two sets of gearing the life of each must of necessity be increased. The crank-axle is inclosed in a casing within which are the hubs of the gears and the movable sleeve or band. The shifting-lever extends down through the vertical tube of the frame and embodies a flat spring which acts as a torsion-spring and prevents breakage of any of the parts and also facilitates the operation.

Other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be specifically defined by the appended claims.

The invention in this instance resides in the peculiar combinations and the construction, arrangement, and adaptation of parts, all as more fully hereinafter described, shown in the drawings, and then particularly pointed out in the claims.

The invention is clearly illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this specification, and in which—

Figure 1 is a vertical longitudinal section through the crank-shaft. Fig. 2 is a section through the vertical tube of the frame with the shifting-lever and connections therein. Fig. 3 is a cross-section through the sleeve

on the crank-axle. Fig. 4 is a cross-section through the hub of one of the sprocket-wheels.

Like letters of reference indicate like parts throughout the several views.

Referring now to the details of the drawings by letter, A designates the crank-axle, and B C the sprocket-wheels, which may be of any required diameters. They are provided with ball-bearings, as shown, and their hubs have their inner ends provided with the notches C', the sprockets being loose upon the axle.

D is a sleeve mounted on the crank axle or shaft between the hubs of the sprockets, as shown, and having its ends provided with notches E. This sleeve is designed to revolve with the crank-axle and it is also mounted to slide endwise thereon, being engaged with the rib or spline G, as shown.

H is a band around the center of this sleeve and serving to strengthen the same, and as it covers the rib or spur it prevents the same from coming out or becoming loose. This band is provided with a circumferential groove I, on or in which travels the roller carried by the shifting-lever.

J is a casing for the crank-shaft. It is provided at the ends with ball-bearings K, as shown, the balls being held by the offsets thereof. With this casing is connected the vertical tubular portion L of the frame, and within this is arranged the shifting mechanism. This comprises the roller M, that travels in the annular groove of the band on the sleeve, and this roller is carried by the yoke N, that is pivotally mounted, as at N', within the lower end of the sleeve or tubular portion of the frame.

O is a shifting-rod in the form of a flat spring, the lower end of which is rigidly connected with the yoke, and the other end is pivotally held within the eye or analogous means P, held within the tubular portion of the frame, and to this spring, near its upper end, is connected the arm Q, that works through a horizontal slot S in the said tubular portion of the frame and the bottom wall of which is provided with the three notches T, into any one of which the said arm is designed to be engaged to hold the sleeve in either of its three positions.



The operation will be apparent. The sleeve is moved so that the notches on the end will engage with those of the desired sprocket-wheel, and these latter may be made of different sizes, so that the speed and power may be changed or the sleeve may be held midway between the two hubs of the sprocket-wheels, and thus out of engagement with both—as, for instance, in coasting.

Modifications in detail may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

What is claimed as new is—

1. The combination with the tubular portion of the frame, of shifting mechanism arranged within said tubular portion and comprising a roller, a pivotally-mounted yoke carrying said roller, a crank-axle, a clutch-sleeve mounted thereon and adapted to slide lengthwise thereof, and a torsion-spring within said tubular portion connected at one end to said yoke, and its other end connected with the shifting-lever, substantially as described.

2. The combination with the crank-axle,

sprocket-wheels, sliding clutch, tubular portion of the frame, shifting-lever and pivoted yoke, a shifting-rod in the form of a flat torsion-spring arranged within the tubular portion of the frame and connected with said yoke lever and frame, substantially as described.

3. The combination with the tubular portion of the frame and a grooved sliding clutch-sleeve on the axle, of the yoke pivoted in said tubular portion, the roller carried by the yoke and working in the groove of the sleeve, the flat spring within the tubular part and pivoted at its upper end and at its lower end connected with the yoke, and the lateral arm connected with the spring and working through a slot in the tubular part, as shown and described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIS A. TICKNER.

Witnesses:

J. CHRISTENSEN,  
L. L. WESTFALL.