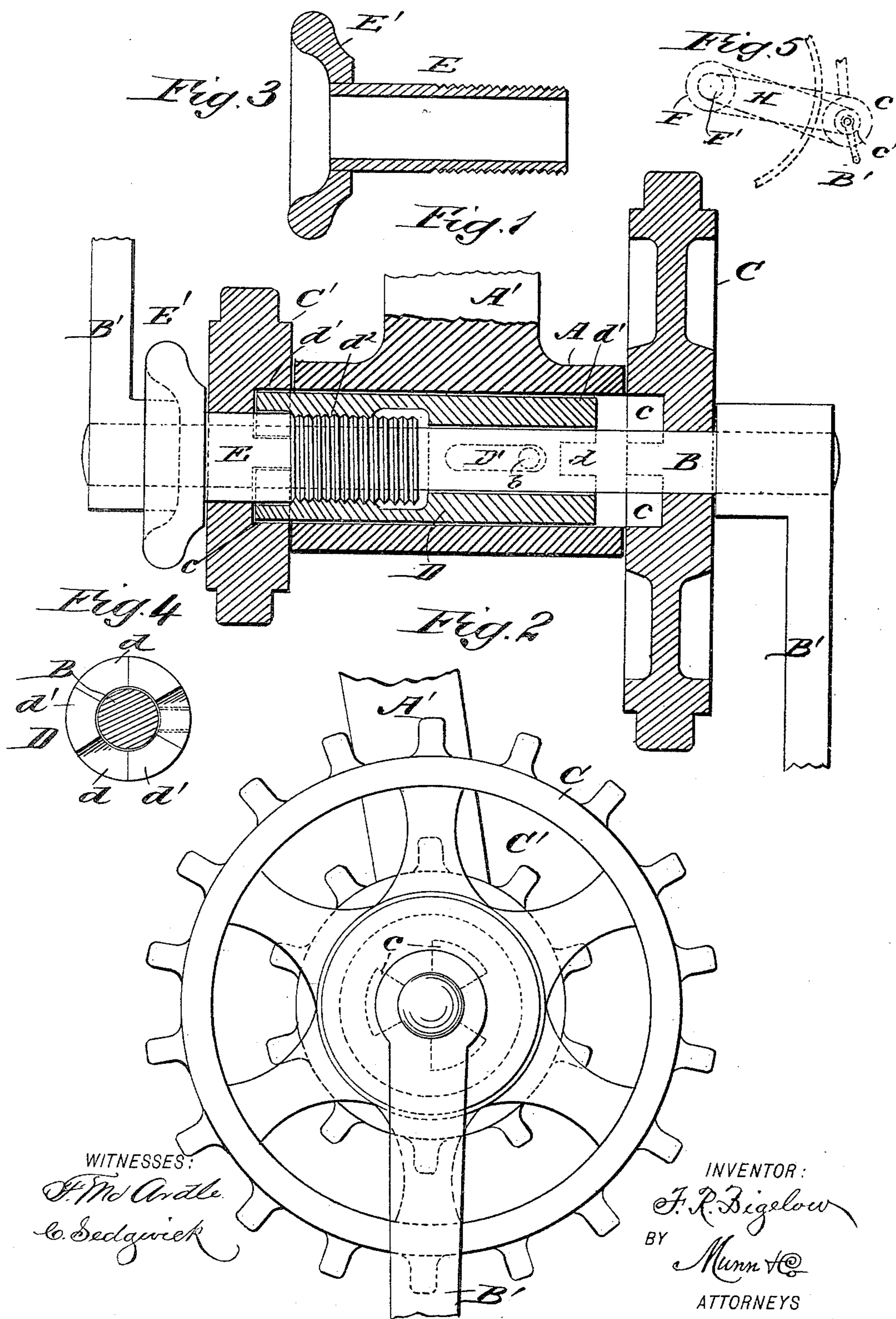


(No Model.)

F. R. BIGELOW.  
BICYCLE.

No. 453,540.

Patented June 2, 1891.



# UNITED STATES PATENT OFFICE.

FRANK R. BIGELOW, OF GLOUCESTER CITY, NEW JERSEY.

## BICYCLE.

SPECIFICATION forming part of Letters Patent No. 453,540, dated June 2, 1891.

Application filed January 30, 1891. Serial No. 379,652. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK R. BIGELOW, of Gloucester City, in the county of Camden and State of New Jersey, have invented a new and Improved Differential Gear for Bicycles, of which the following is a full, clear, and exact description.

My invention relates to improvements in a differential gear for bicycles or other kinds of velocipedes; and the object of my invention is to produce a simple and efficient device by means of which a bicycle-gear may be quickly changed, so that the bicycle may be driven rapidly where the road is easy, or it may be changed to give more power and less speed where the road is loose or hilly.

To this end my invention consists in certain features of construction and combinations of parts, which will be hereinafter described and claimed.

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

Figure 1 is a broken sectional view showing the device applied to the treadle-shaft of a bicycle. Fig. 2 is a broken end view of the same. Fig. 3 is a detail sectional view of the thumb-screw by which the device is adjusted. Fig. 4 is a detail end view, partly in section, showing the construction of the toothed sleeve; and Fig. 5 is a detail diagrammatic view showing the manner in which the gear is connected to the sprocket-wheel of a bicycle.

A represents the bearing of the treadle-shaft, which is supported by an arm A' in the usual manner, and through which extends longitudinally the treadle-shaft B, which has a crank B' at each end, and the shaft is turned by means of the cranks in the ordinary way.

Mounted loosely on the treadle-shaft B at opposite ends of the bearing A are the sprocket-wheels C and C', the sprocket-wheel C being considerably larger than the other sprocket-wheel, whereby the speed of the machine will be fast or slow, accordingly as the power is taken from the larger wheel C or the smaller one C'. Each of the sprocket-wheels has on its inner side, at a point adjacent to the shaft B, a series of sockets c, which receive the

teeth on the sliding sleeve, as described below, and enable the sprocket-wheels to be driven.

Within the bearing A is a sleeve D, which corresponds in length to the length of the hub, and which is held to slide on the shaft B. Near the center of the sleeve D is a longitudinal slot D', through which extends a pin b, secured to the shaft B, so that the sleeve is permitted to slide on the shaft, but the pin causes the sleeve to turn with the shaft. The sleeve D has a series of recesses d at each end, thus forming projecting teeth d', which teeth are shaped to fit the sockets c in the sprocket-wheels C and C', so that by sliding the sleeve and bringing the teeth into engagement with the sockets of one of the sprocket-wheels that sprocket-wheel will be driven when the shaft B is turned.

A hollow thumb-screw E is mounted loosely on the shaft B and extends through the sprocket-wheel C' into the end of the sleeve D, which is counterbored to receive it. The inner end of the thumb-screw is externally threaded, as best shown in Fig. 1, and the sleeve D is internally threaded, as shown at d<sup>2</sup>, to fit the thread of the thumb-screw. The outer end of the thumb-screw is provided with a handle-disk E', so that it may be conveniently turned, and by screwing the thumb-screw out or in the sleeve D may be moved and caused to engage one of the sprocket-wheels. It is obvious that the thumb-screw may be arranged at either end of the hub A, and that either end of the sleeve D may be screw-threaded to receive it.

In Fig. 5 I have shown in dotted lines a detail view showing the manner in which the gear is connected with a bicycle-wheel, and as there are two sprocket-wheels there must be two sprocket-wheels on the bicycle-wheel, one on each side, and these are preferably made of different sizes, the larger F' connecting by a chain H with the smaller sprocket-wheel C' and the smaller wheel F' on the main bicycle-wheel connecting by a similar chain with the larger of the treadle-sprockets C. It will thus be seen that by shifting the sleeve D, which serves as a clutch, either of the sprocket-wheels may be driven and the

bicycle may be propelled with great power and at moderate speed, or, if the road is easy, it may be driven with great velocity.

I have shown the gear mechanism in connection with a treadle-shaft which is suspended by an arm, and which is specially intended for use on Safety bicycles; but it is obvious that the same mechanism may be applied to the hub of a bicycle-wheel, if desired.

When the machine is to be driven rapidly, the sleeve D is made to engage the sprocket-wheel C, so that that wheel serves as a driving-wheel, and if the machine is to be driven slower, but with greater power, the sleeve is connected with the smaller sprocket-wheel.

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

1. A differential gear for bicycles, comprising a treadle-shaft, sprocket-wheels of differ-

ent sizes mounted thereon and provided on their inner sides with sockets, a sleeve held to slide on and turn with the shaft, said sleeve having teeth at each end to enter the sockets, and a screw mechanism for moving the sleeve, substantially as described.

2. A differential gear for bicycles, comprising a treadle-shaft, sprocket-wheels of different sizes mounted thereon, a hub for the shaft, a sleeve mounted in the hub and on the shaft, said sleeve being adapted to slide upon and turn with the shaft and having teeth at each end, said sleeve having also an internal screw-thread, and a hollow thumb-screw mounted on the shaft and adapted to engage the thread of the sleeve, substantially as described.

FRANK R. BIGELOW.

Witnesses:

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