

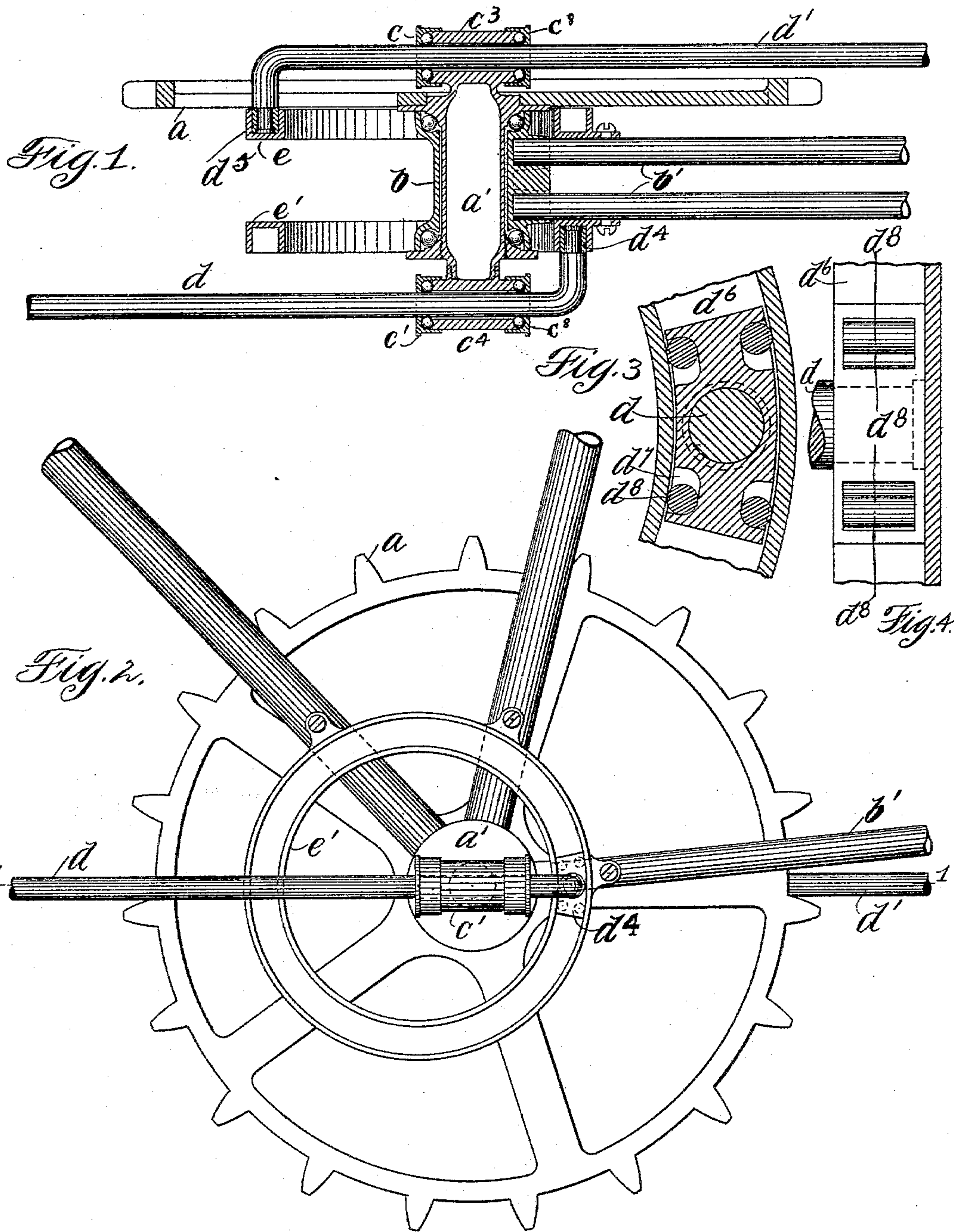
(No Model.)

2 Sheets—Sheet 1.

J. RAU.
BICYCLE.

No. 571,793.

Patented Nov. 24, 1896.



Witnesses:
George L. Cragg.
De Witt C. Tanner.

Inventor:
John Rau.
By Barton Brown
Attorneys.

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Fig. 5.

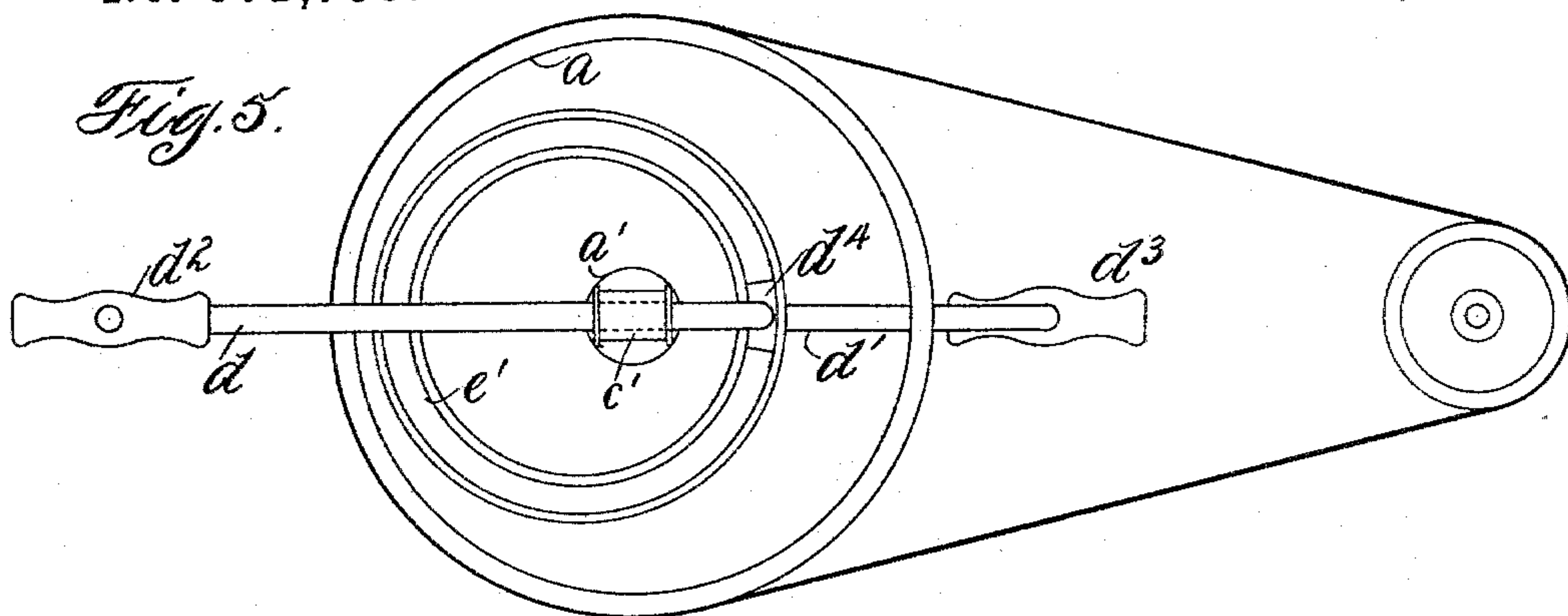


Fig. 6.

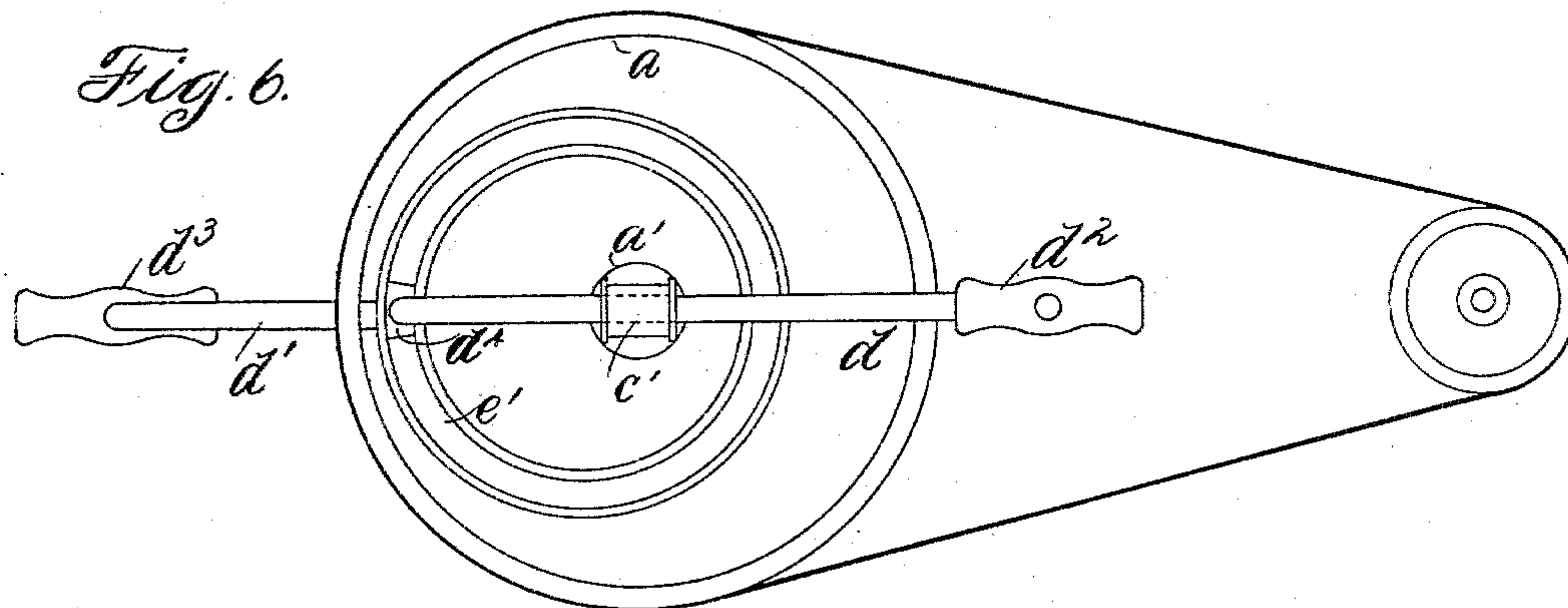
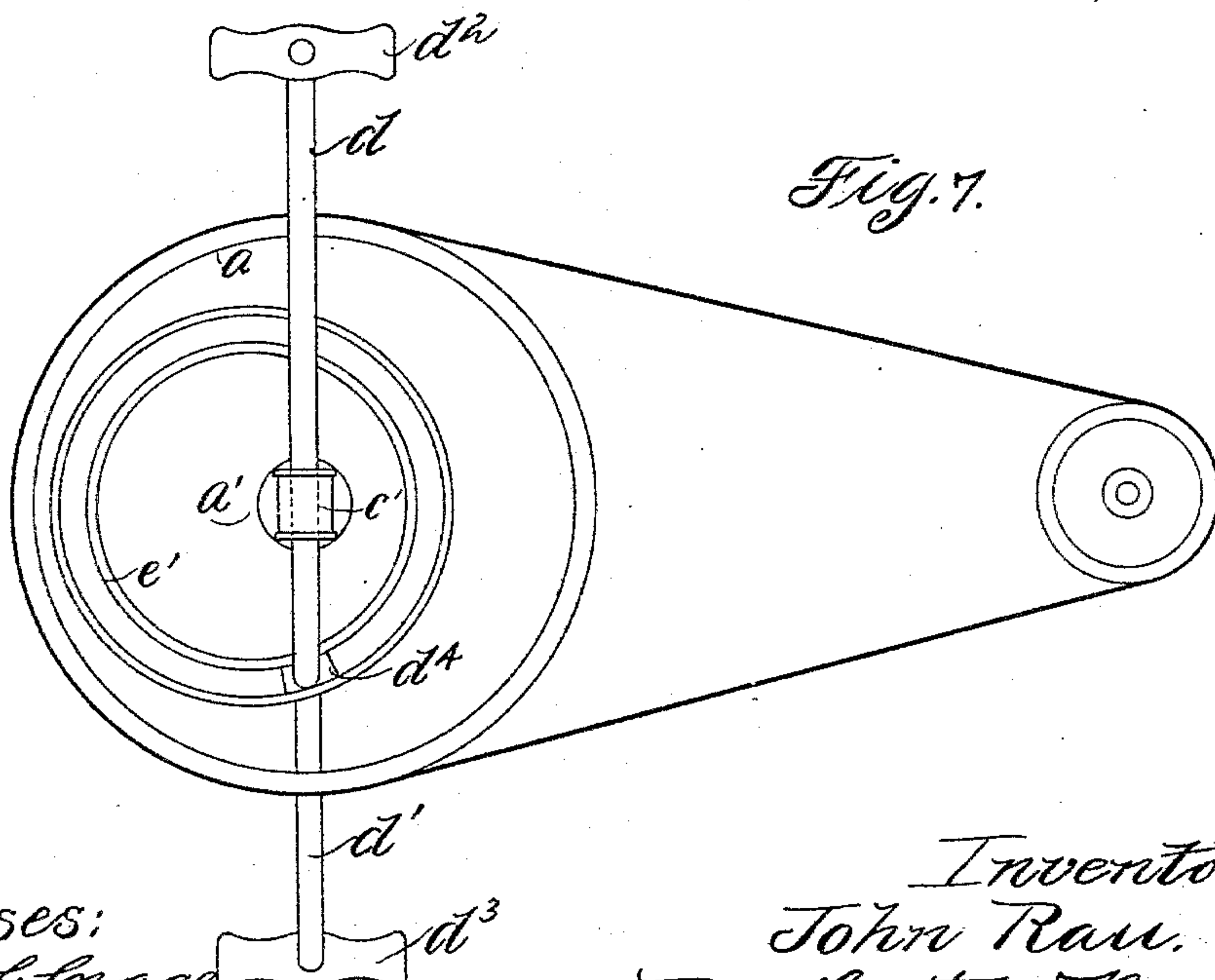


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN RAU, OF CHICAGO, ILLINOIS, ASSIGNOR TO FRANK L. SALISBURY,
JOHN E. SALISBURY, AND CLARENCE E. BRINCKERHOFF, OF SAME
PLACE.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 571,793, dated November 24, 1896.

Application filed January 28, 1895. Serial No. 538,405. (No model.)

To all whom it may concern:

Be it known that I, JOHN RAU, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Bicycles, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to the driving mechanism of bicycles of the class usually known as "safeties," in which the main driving-shaft upon which the cranks are mounted is provided with a sprocket-wheel carrying a sprocket-chain which runs over a sprocket-pinion provided on the shaft of the rear wheel.

My invention consists in the novel construction, arrangement, and combination of parts, as hereinafter fully described, illustrated in the drawings, and pointed out in the appended claim.

My invention will be more readily understood by reference to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a horizontal section of the driving mechanism embodying my invention, taken on line 1 1 of Fig. 2. Fig. 2 is an elevation of the driving mechanism. Figs. 3 and 4 are details of the cams working within the cam-grooves of the symmetrically-disposed cam-plates. Figs. 5 and 6 are diagrammatic illustrations showing the relation of the parts when the cranks occupy a horizontal position. Fig. 7 is a diagrammatical illustration showing the relation of the parts when the cranks occupy a vertical position.

Like letters refer to like parts throughout the several figures.

The driving gear-wheel *a* is mounted rigidly upon the shaft *a'*, which is mounted upon and supported by the bearing *b*, carried upon the frame *b'* of the machine.

c c' indicate guideways, one of which at least should be removably mounted upon one end of the shaft *a'*, (in order that the parts might be arranged within the hanger of the machine,) as by screwing said guideway upon the shaft, as shown, while the other guideway might be formed integrally with the other end of the shaft. These guideways ac-

commodate the treadle-levers *d d'*, which are adapted to be reciprocated within said guideways as the pedals are rotated. The guideways are preferably made as shown in Fig. 1, wherein cylindrical portions *c³ c⁴* are extended from the shaft *a'*. Ball-bearings are provided in the cylinders to lessen the friction upon the pedal-levers. Cam-plates *e e'* are mounted symmetrically and preferably upon the frame of the machine, as shown. These cam-plates, as hereinbefore stated, are preferably circular, in which case they are disposed eccentrically with relation to the driving-shaft.

The treadle-levers *d d'* are provided upon one end with the pedals *d² d³* and upon the other end with cams *d⁴ d⁵*. The cams are preferably made in the manner shown in Figs. 3 and 4, wherein are illustrated a cam-groove *d⁶* of a cam-plate, one end of a treadle-lever *d*, and the cam provided with recesses *d⁷*, in which are placed the bearing-rollers *d⁸*.

In driving bicycles it is desirable to have greater leverage upon the downstroke of the pedals, and the point at which it is desired to have the greatest leverage is at the middle of the downward stroke or, in other words, at that point when the pedal reaches a horizontal plane coincident with the shaft. With this end in view I place the cam-plates with their points of greatest eccentricity with relation to the shaft upon the horizontal plane and in front of the shaft.

Referring now more particularly to Figs. 5, 6, and 7, it will be seen how the distance between the shafts of the pedals and the fulcrum of the pedal-levers or the center of the driving-shaft varies.

In Figs. 5 and 6 the pedals are shown in a horizontal plane coincident with the axis of the shaft, the lever *d* in Fig. 5 being shown in its most extended position with relation to its fulcrum, while the same lever is shown in Fig. 6 at the shortest distance from its fulcrum. The centers of the shaft and the eccentric cam-plates occupying a fixed position with relation to each other, it will be seen that the distance between the center of the shaft and the pivotal point between the pedal-levers and the cams varies as the pedals are rotated. Tracing the travel of the pedal *d²*

about the shaft of the driving sprocket-wheel, when the pedal occupies the position shown in Fig. 5 the distance between the pivotal connection of the cam with the pedal-lever and the shaft of the driving sprocket-wheel is less than when the cam and pedal occupy any other position, since the point of greatest eccentricity of the cam-plate is between the pedal and the driving-shaft. The pedal d^2 is thus farthest removed from the shaft of the driving sprocket-wheel, thereby increasing the leverage at the point desired.

When the pedals are brought in a vertical line, as shown in Fig. 7, they are equidistant from the center of the driving-shaft. Since the center of the eccentric cam-plates and the center of the driving-shaft are on the same horizontal line, any vertical line intersecting the line of travel of the pivotal connections between the cams and the treadle-levers through the center of the driving-shaft will intercept said line of travel at points equidistant from the center of the shaft on opposite sides of said horizontal line. When the pedal d^2 has made a half-revolution, the distance between its shaft and the driving-shaft is brought to a minimum, as shown in Fig. 6, since the center of the driving-shaft is now between the point of greatest eccentricity and the center of the shaft of the pedal.

I am aware of Letters Patent of the United States No. 96,124 and Letters Patent of Great Britain No. 972 of 1881 and No. 9,207 of 1888 and do not claim anything therein shown or described.

I would say that in order that the ball-bearings within the guideways $c\ c'$ may be as nearly dust-proof and frictionless as possible, I provide the dust-caps c^s at the ends of the said guideways and inclosing the antifriction-balls, as shown.

In a prior application I have illustrated mechanism whereby the distance between the shaft of the pedal-lever and the shaft of the driving sprocket-wheel has been varied. I therefore limit my claim in the present instance to the combinations of mechanisms as follows.

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

In a bicycle, the combination with the frame thereof and the driving-shaft, of cylindrical guideways on the ends of the said shaft, annular rings secured to the frame intermediate the said guideways, said rings being arranged eccentrically to the driving-shaft and being provided with grooves in their outer faces, pedal-levers passing slidably through the guideways and having their ends opposite to those which carry the pedals, bent inwardly, a block mounted upon said bent end of each lever and curved to correspond with the curvature of the grooves in the rings, and seating within said groove, said blocks being provided with recesses d^7 in their opposite faces and adjacent to their opposite ends, antifriction-rollers d^8 seated in said recesses and bearing upon the walls of the grooves of the rings, antifriction-balls arranged within the cylindrical guideways at opposite ends thereof and bearing upon the pedal-levers, and dust-proof caps upon the ends of said guideways and inclosing the said balls and through which caps the pedal-levers slidably pass, as specified.

In witness whereof I hereunto subscribe my name this 23d day of January, A. D. 1895.

JOHN RAU.

Witnesses:

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