

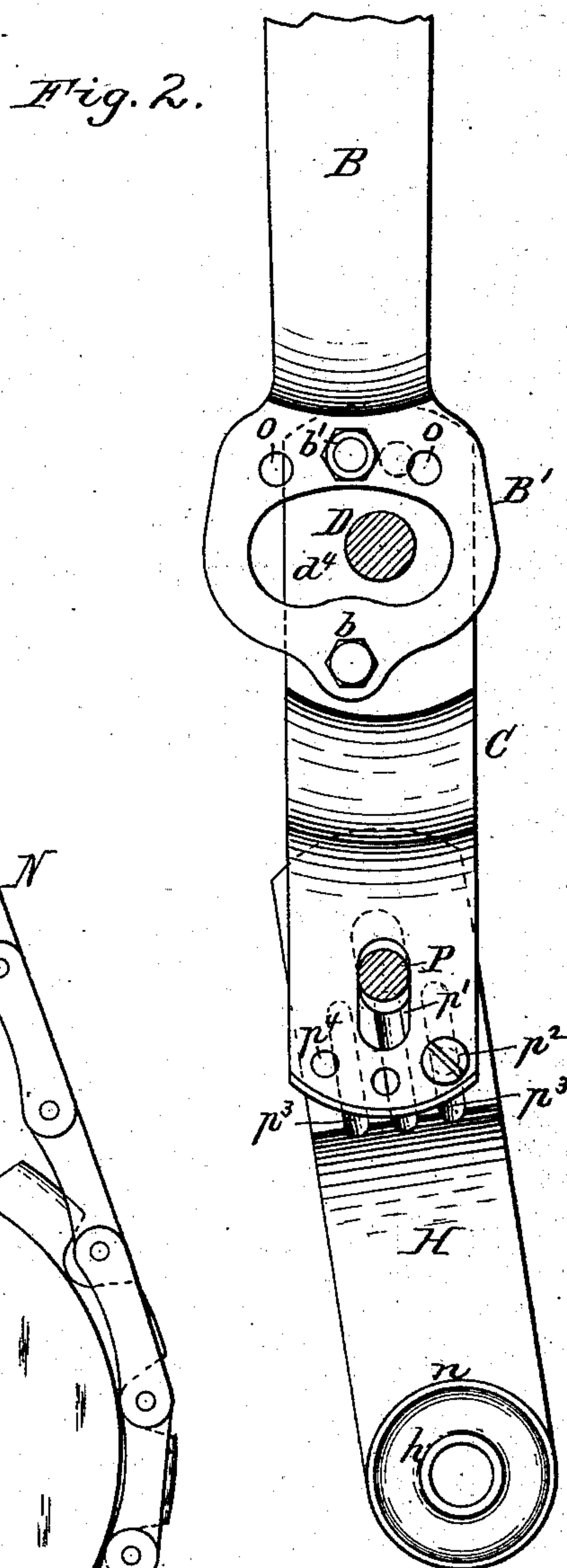
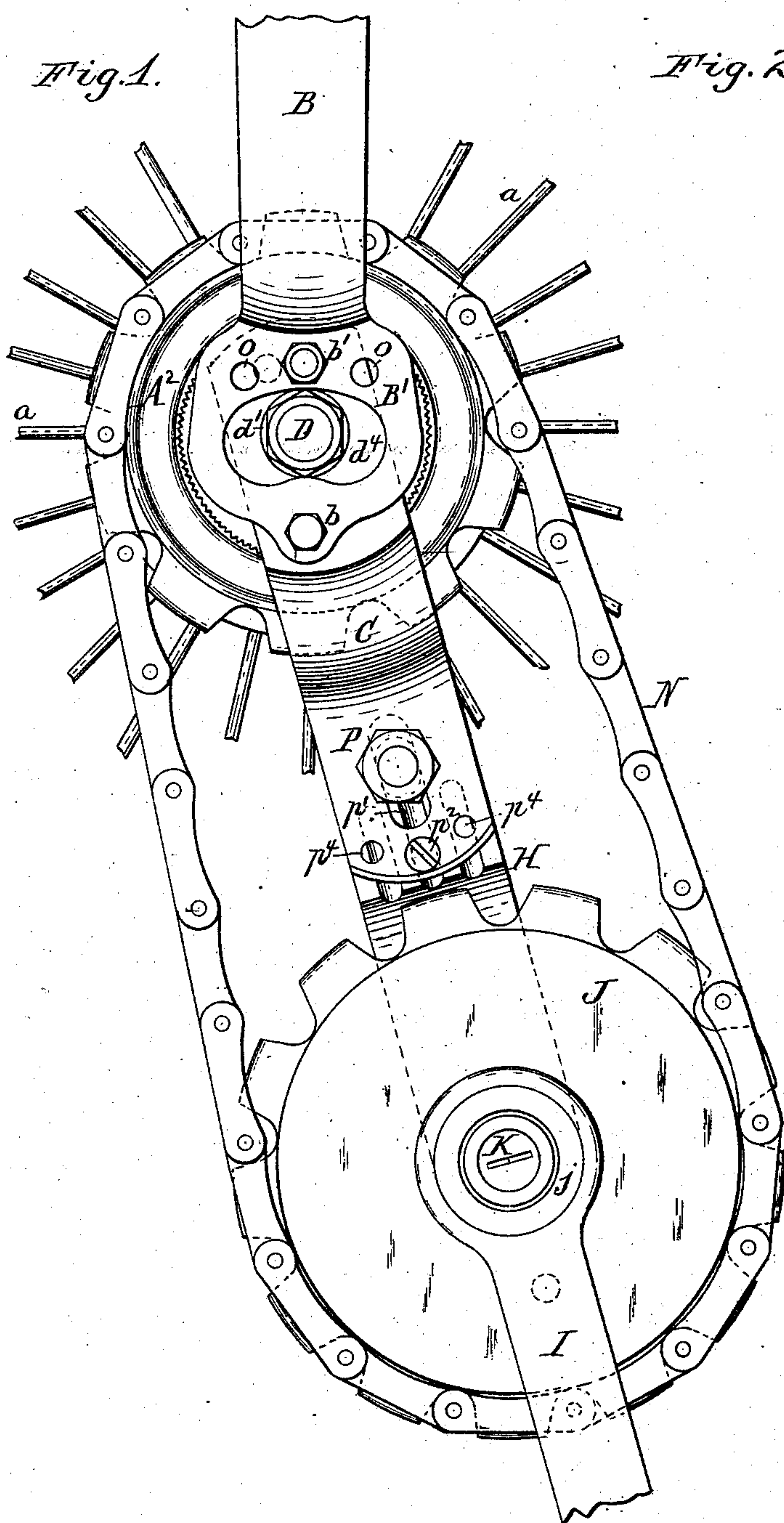
(No Model.)

3 Sheets—Sheet 1.

E. G. LATTA.  
BICYCLE.

No. 315,304.

Patented Apr. 7, 1885.



Witnesses:

Geo. E. Petman

Otto H. Kriebitz

E. G. Latta Inventor.

By Wilhelm Böninger.

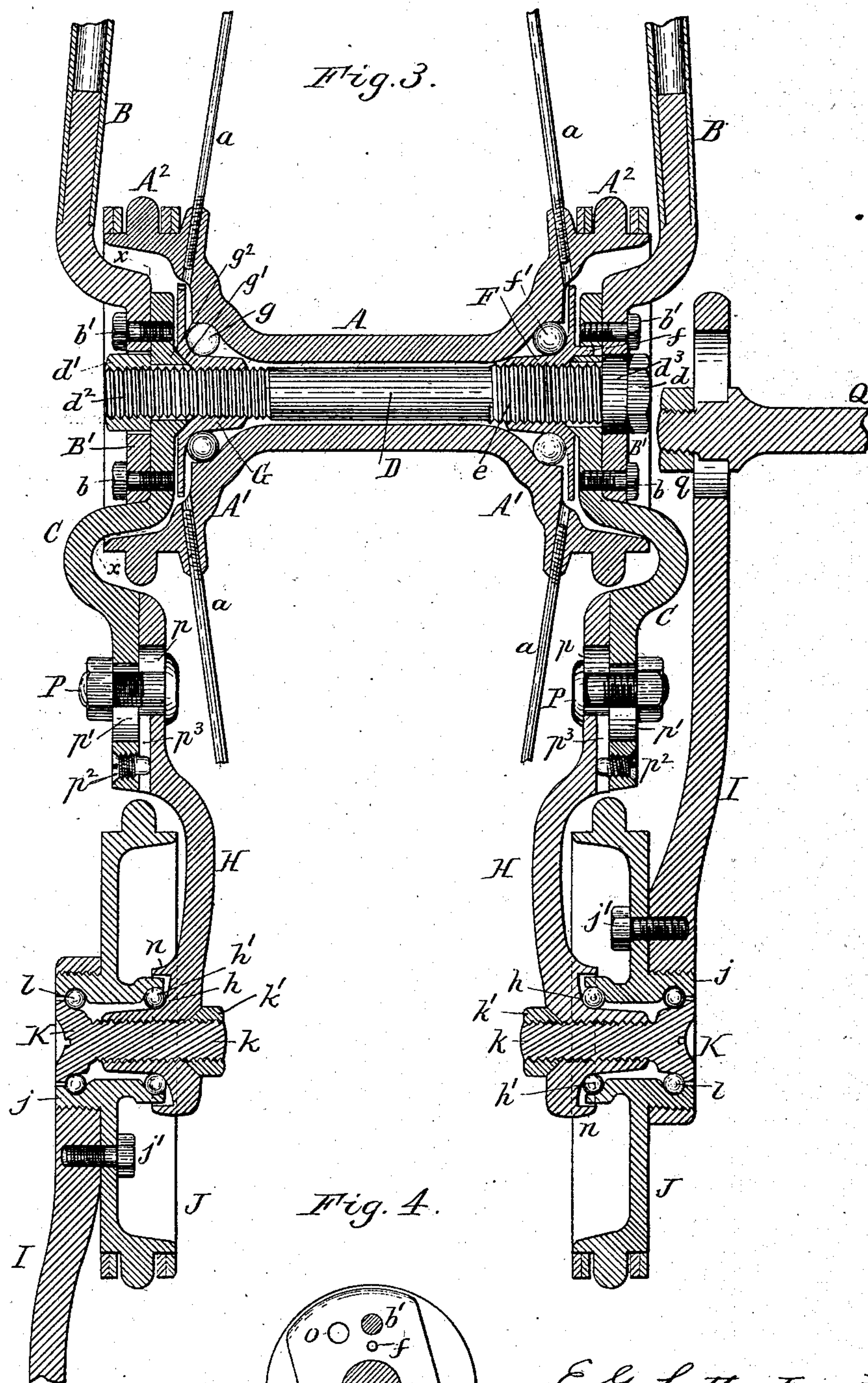
*Attorneys.*



E. G. LATTA.  
BICYCLE.

No. 315,304.

Patented Apr. 7, 1885.



Witnesses:

Geo. E. Pitman

Otto H. Krotz

E. G. Latta Inventor.  
By Wilhelm H. Krotz  
Attorneys.



(No Model.)

3 Sheets—Sheet 3.

E. G. LATTA.  
BICYCLE.

No. 315,304.

Patented Apr. 7, 1885.

Fig. 5.

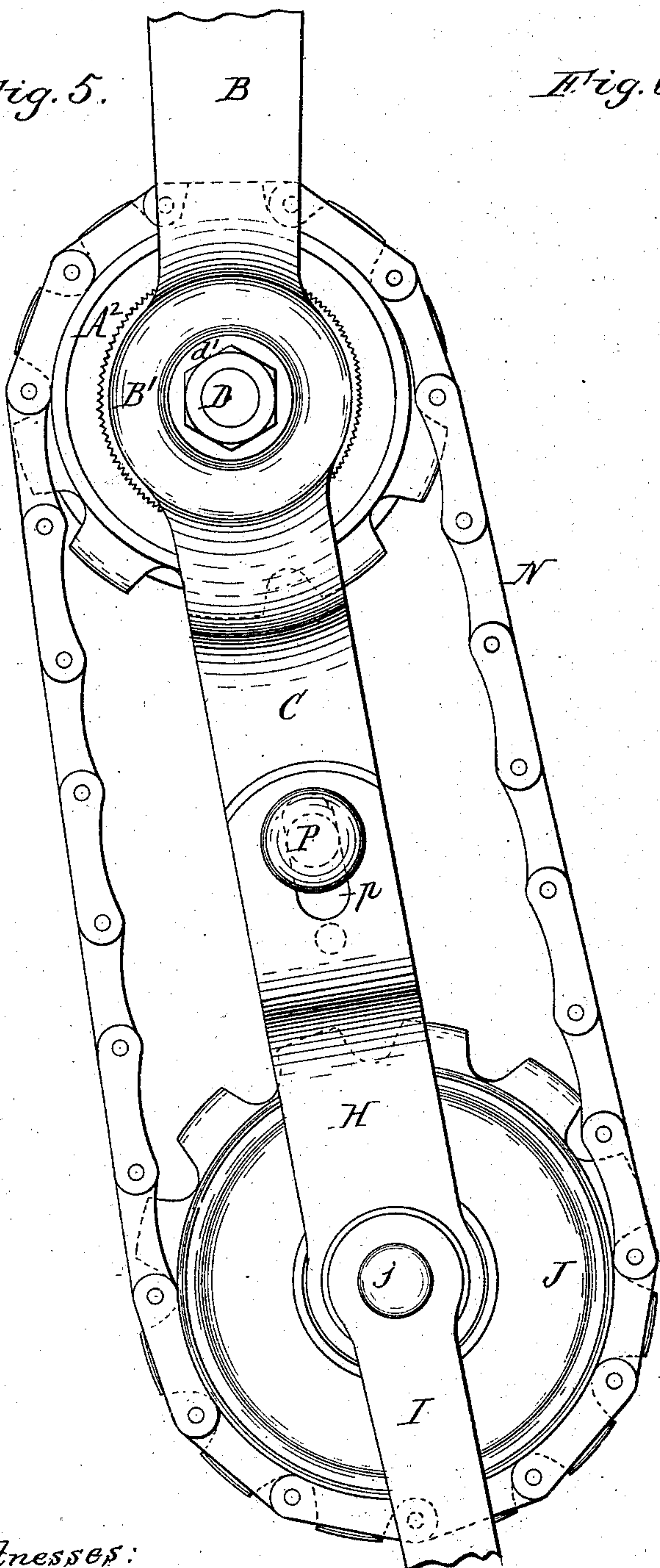
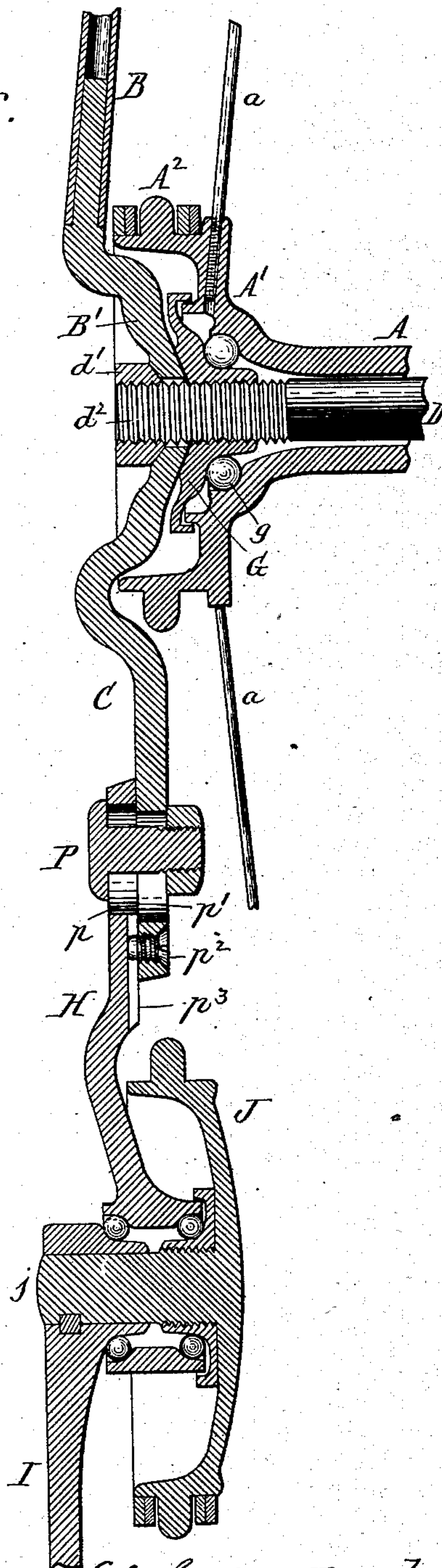


Fig. 6.



Witnesses:

Geo. C. Pitman  
Otto H. Krosz.

E. G. Latta Inventor.  
By Wilhelm H. Krosz.  
Attorneys.



# UNITED STATES PATENT OFFICE.

EMMIT G. LATTA, OF FRIENDSHIP, NEW YORK.

## BICYCLE.

SPECIFICATION forming part of Letters Patent No. 315,304, dated April 7, 1885.

Application filed February 5, 1885. (No model.)

*To all-whom it may concern:*

Be it known that I, EMMIT G. LATTA, of Friendship, in the county of Allegany and State of New York, have invented new and useful Improvements in Bicycles, of which the following is a specification.

This invention relates to improvements in that class of bicycles known as "safety-bicycles," in which the cranks are arranged below the axles of the driving-wheel and connected with the driving-wheel by endless chains and sprocket-wheels.

The invention has reference to improvements in the driving mechanism of this class of bicycles, whereby various desirable results are attained; and the invention consists of the improvements which will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, consisting of three sheets, Figure 1 is a side elevation of my improved driving mechanism. Fig. 2 is a sectional side elevation of the fork and its extension. Fig. 3 is a vertical cross-section of the driving mechanism. Fig. 4 is a vertical section in line *x x*, Fig. 3. Fig. 5 is a side elevation of a modified construction of the driving mechanism. Fig. 6 is a cross-section of the same.

Like letters of reference refer to like parts in the several figures.

A is the central or tubular part of the hub of the driving-wheel.

A' A' are the hub-flanges, formed at both ends of the central part, A, and carrying the spokes *a*, and A<sup>2</sup> are the upper chain or sprocket wheels, formed on the hub-flanges A'.

B B are the arms of the fork arranged outside of the sprocket-wheels A<sup>2</sup>, and having their lower ends bent inwardly into the recesses formed in the outer sides of the sprocket-wheels, and provided therein with flat ears or lugs B'.

C C represent downward extensions of the fork-arms, secured with their upper ends to the inner sides of the flat ears B' by screws *b b'*.

D is a transverse horizontal screw-bolt, which connects the ears of the fork-arms and extends through the hub A of the driving-wheel. The bolt D is provided at one end with a head, *d*, and at the other end with a screw-nut, *d'*, which engages with the threaded end *d''* of the bolt, and whereby the latter is secured to the fork-arms.

*d*<sup>3</sup> is a cylindrical collar formed on the bolt D, on one side of the head *d*, and engaging with an elongated opening, *d'*, formed in the adjacent ear B' of the fork-arm. The nut *d'* is provided on its inner side with a similar cylindrical collar, which engages in a similar elongated opening in the ear B' of the fork-arm in which the nut is arranged.

*e* is a screw-threaded shank formed on the bolt D, on the inner side of the head *d* and collar *d*<sup>3</sup>, and made somewhat larger in diameter than the body of the bolt.

F represents the stationary cone of the driving-wheel bearing, secured to the threaded shank *e* of the bolt D, and held against turning by a pin or projection, *f*, formed on the cone and engaging in an opening in the adjacent extension C.

*f'* represents the balls, interposed between the cone F and the hub-flange A'.

G represents the movable cone, applied to the threaded end *d''* of the bolt D, and provided with an internal screw-thread working on the same. The edge of the flange of the cone G is milled to facilitate turning the same.

*g* are balls interposed between the cone G and the adjacent hub-flange A'.

The openings in the extensions C C, through which the bolt D passes, are larger than the threaded portions of the bolt, to enable the latter to draw the cone F and the adjacent extension C tightly together, and the nut *d'* to draw the cone G and the adjacent extension C tightly together.

The cones F and G are provided on their outer sides with conical depressions *g'*, and the extensions C with conical projections *g''*, which enter the depressions *g'* and center the openings in the extensions C with reference to the bolt D. The latter forms a rigid connection between the lower ends of the fork-arms, relieves the weight of the rider, and causes the fork-arms to brace each other, thereby enabling them to be made lighter than heretofore, and causing the bearings to run freely regardless of the twist given to the lower end of the fork-extensions C. It also enables both sides of the bearings to be adjusted at the same time and adjusted alike.

H H represent supporting-arms secured to the lower ends of the extensions C of the fork-arms.

I represents the cranks, and J the lower chain or sprocket wheels, secured to the inner ends



of the cranks and supported on the arms H. The chain-wheels J are provided on their outer sides with hubs  $j$ , having external screw-threads upon which the cranks I are screwed, and the cranks are further secured to the wheels J by screws  $j'$ .

The chain-wheels J are supported on the arms H by ball-bearings constructed as follows:

10  $h$  is the stationary cone, formed on the outer side of the arm H, near its lower end, and  $h'$  are the balls interposed between the stationary cone  $h$  and the adjacent inner portion of the hub of the wheel J.

15  $K$  is the adjustable cone, arranged in the outer portion of the hub of the wheel J, and provided with a screw-shank,  $k$ , which works in a threaded opening in the stationary cone  $h$ , and is provided on the inner side of the arm

20 H with a screw-nut,  $k'$ , whereby the bearing is tightened. The latter is adjusted by inserting a screw-driver in the slot formed in the outer side of the cone  $K$ , and turning the latter, and then securing the cone in position

25 by tightening the nut  $k'$ .  $l$  represents the balls, interposed between the movable cone  $K$  and the outer portion of the hub of the wheel J.

30  $n$  represents an annular dust-flange formed on the outer side of the arm H, and projecting beyond the inner end of the hub  $j$  of the wheel J. This construction affords a very simple, compact, strong, and efficient ball-bearing.

35  $N$  represents endless chains running around the wheels  $A^2$  and J, and transmitting the motion of the cranks to the driving-wheel.

40  $O$  represents a series of openings formed in each ear  $B'$  of the fork-arms, equidistant from the bolt  $b$ , so that the fastening-bolt  $b'$  can be engaged with either of said openings by swinging the extension C on the bolt  $b$  as a fulcrum, thereby changing the position of the extension C with reference to the fork-arms B, and moving the center of the driving-wheel forward or backward, as may be desired. By moving the driving-wheel forward the lower ends of the arms H and the cranks I supported thereon are moved backward, whereby more rake and greater safety is obtained; while by moving the driving-wheel backward the cranks are moved forward, whereby less rake and a more direct action is obtained. This permits the frame of the driving-wheel to be adjusted

45 closely to the backbone when the roads are in good condition, or farther from it when the roads are bad, and prevents the accumulation of dirt around the lower part of the steering-head. The elongated openings  $d^1$ , formed in the ears  $B'$ , permit of the requisite movement of the connecting-bolt D in making these adjustments. The upper end of the extension C may also be provided with a number of openings for the reception of the fastening-bolt  $b$ , to further increase the range of adjustment.

P is a fastening-bolt, whereby the upper end

of the arm H is secured to the lower end of the extension C, and which passes through elongated openings  $p$   $p'$ , formed, respectively, in the arm H and extension C. Upon loosening the bolt P the arm H can be raised or lowered on the extension C, thereby decreasing or increasing the distance between the crank and the driving-wheel, when required, for tightening the chains or for adjusting the cranks to the size of the rider. When the range of adjustment afforded by the slots  $p$   $p'$  is insufficient, the arms H can be detached from the extension C, and longer or shorter arms can be substituted, as may be necessary.

75  $p^2$  is a set-screw secured in the lower portion of the extension C, and engaging in one of a series of upright grooves,  $p^3$ , formed in the face of the upper portion of the arm H. The screw  $p^2$  prevents the arm H from turning on the fastening-bolt P as a pivot after it has been adjusted, and the upright grooves  $p^3$  permit the set-screw to be engaged with the arm H under the various adjustments of the said arm on the fastening-bolt P. The lower end of the extension C may be provided with a number of openings,  $p^4$ , for the reception of the set-screw  $p^2$ , to further increase the range of adjustment. Upon releasing the set-screw  $p^2$ , the arm H can be swung on the fastening-bolt P to move the crank-wheel forward or backward, when it is desired to adjust the crank-wheel without disturbing the adjustment of the driving-wheel.

100  $Q$  represents the pedal-pin, and  $q$  the screw-nut, arranged on one side of the slotted end of the crank, and by which the pedal-pin is secured to the crank. The upper portion of the extension C is bent outwardly beyond the outer edge of the adjustable chain-wheel  $A^2$ , and then bent inwardly below the chain-wheel, so that the lower portion of the extension C and the upper portion of the arm H secured thereto stand about below the chain-wheel  $A^2$  and between the side portions of the endless chain running around the same, as shown in Figs. 1 and 3. The lower portion of the arm H is bent still farther inwardly, and stands on the inside of the lower chain-wheel, J. This construction of the lower portions of the arm which supports the cranks and connecting parts permits the nuts  $q$  to be arranged very closely against the outer edges of the chains N, as represented in Fig. 3, the screw-nuts  $q$  moving through the spaces between the bent portions of the fork-arms B and the upper portions of the extension C, as shown in the right-hand portion of Fig. 3; or, if the cranks are arranged very far below the center of the driving-wheel the screw-nuts  $q$  can move through the spaces below the swell in the extension C. This construction reduces the width or tread of the driving-mechanism twice the thickness of the fork-extensions C, and renders the machine easy to operate, and more compact, convenient, and durable than heretofore.

The modified construction represented in



Figs. 5 and 6 is suitable for less expensive machines. In this construction the bolt D is not adjustable in the fork, and the driving-wheel can therefore not be adjusted backwardly and forwardly, and the extensions C form downward continuations of the ears B', with which they are formed in one piece. The arm H is located on the outer side of the lower chain-wheel, J, which latter is recessed on its outer side to receive the lower end of the arm H and the ball-bearing, whereby the chain-wheel is connected with the arm H. This construction has the same advantage of narrow tread, facility of adjusting the chains, and cranks secured directly to the chain-wheel, and permits the chain-wheel and crank to be adjusted forwardly or backwardly at desire.

I claim as my invention—

1. In a bicycle, the combination, with the driving-wheel hub A' provided at its ends with chain-wheels A<sup>2</sup>, recessed in their outer sides, of the fork-arms B, bent into the recesses of the wheels, and a connecting-bolt, D, substantially as set forth.

2. In a bicycle, the combination, with the driving-wheel hub A, provided at its ends with chain-wheels A<sup>2</sup>, recessed in their outer sides, of the fork-arms B, bent into the recesses of the wheels, a connecting-bolt, D, and downward extensions C, bent around the lower portions of the chain-wheels, substantially as set forth.

3. In a bicycle, the combination, with the driving-wheel hub provided with chain-wheels A<sup>2</sup> and the fork-arms B, of the cranks and crank-wheels I J, endless chains N, and supporting-arms C H, extending downwardly from the fork-arms between the upright portions of each endless chain, substantially as set forth.

4. The combination, with the fork and driving-wheel, of an adjustable support in which the driving-wheel is journaled, and whereby said wheel can be adjusted forwardly and backwardly in the fork, substantially as set forth.

5. The combination, with the fork-arms B, of the extensions C, pivotally secured to the same, a bolt, D, connecting the extensions C, and a driving-wheel journaled on the bolt D, substantially as set forth.

6. The combination, with the fork-arms and the driving-wheel hub provided with chain-wheels A<sup>2</sup>, of the cranks and crank-wheels I J, and adjustable supporting-arms whereby the cranks and crank-wheels can be adjusted forwardly or backwardly, substantially as set forth.

7. The combination, with the fork-arms and the driving-wheel hub provided with chain-wheels A<sup>2</sup>, of the cranks and crank-wheels I J, fork-extensions C, and supporting-arms H, pivoted to said extensions, substantially as set forth.

8. The combination, with the fork-arms and the driving-wheel hub provided with chain-

wheels A<sup>2</sup>, of the cranks and crank-wheels I J, endless chains N, and supporting-arms H, made vertically-adjustable, for raising and lowering the cranks and crank-wheels, substantially as set forth.

9. The combination, with the fork-arms and the driving-wheel hub provided with chain-wheels A<sup>2</sup>, of the cranks and crank-wheels I J, fork-extensions C, and supporting-arms H, provided, respectively, with slots *p p'* and connecting-bolt P, substantially as set forth.

10. The combination, with the fork-arms and the driving-wheel hub provided with chain-wheels A<sup>2</sup>, of the cranks and crank-wheels I J, fork-extensions C, supporting-arms H, provided, respectively, with slots *p p'*, set-screw *p<sup>2</sup>*, and grooves *p<sup>3</sup>*, and connecting-bolts P, substantially as set forth.

11. The combination, with the fork-arms and the driving-wheel hub provided with chain-wheels A<sup>2</sup>, of the cranks and crank-wheels I J, and supporting-arms for the same detachably connected with the fork-arms, substantially as set forth.

12. The combination, with the fork-arms, the driving-wheel hub provided with chain-wheels, and the cranks and crank-wheels, of supporting-arms pivoted to the fork-arms and carrying the driving-wheel, and the crank-wheels on opposite sides of their pivots, whereby the driving-wheel and crank-wheels can be adjusted simultaneously in opposite directions, substantially as set forth.

13. The combination, with the fork-arms B, provided with ears B', having elongated openings *d<sup>4</sup>*, of the fork-extensions C, secured to the ears B' by bolts *b b'*, a bolt, D, connecting the extensions C C, and the driving-wheel hub journaled on the bolt D, substantially as set forth.

14. The combination, with the fork-arms B, extensions C, and driving-wheel hub A, of the connecting-bolt D, provided with threaded portions *d<sup>2</sup> e*, nut *d'*, and head *d*, stationary cone F, applied to the threaded portion *e*, and movable cone G, applied to the threaded portion *d<sup>2</sup>*, substantially as set forth.

15. The combination, with the crank-wheel J, provided with a hub, *j*, of the crank I, secured upon the hub *j*, substantially as set forth.

16. The combination, with the crank-wheel J, provided with a threaded hub, *j*, of the crank I, screwed upon the hub *j*, and secured by a bolt, *j'*, substantially as set forth.

17. The combination, with a wheel, J, provided with a grooved hub, of a fixed cone, *h*, provided with a threaded opening, a movable cone, K, provided with a threaded bolt, *k*, working in said opening, and a nut, *k'*, substantially as set forth.

Witness my hand this 26th day of January, 1885.

EMMIT G. LATTA.

Witnesses:

ADRIAN C. LATTA,  
S. G. LATTA.