

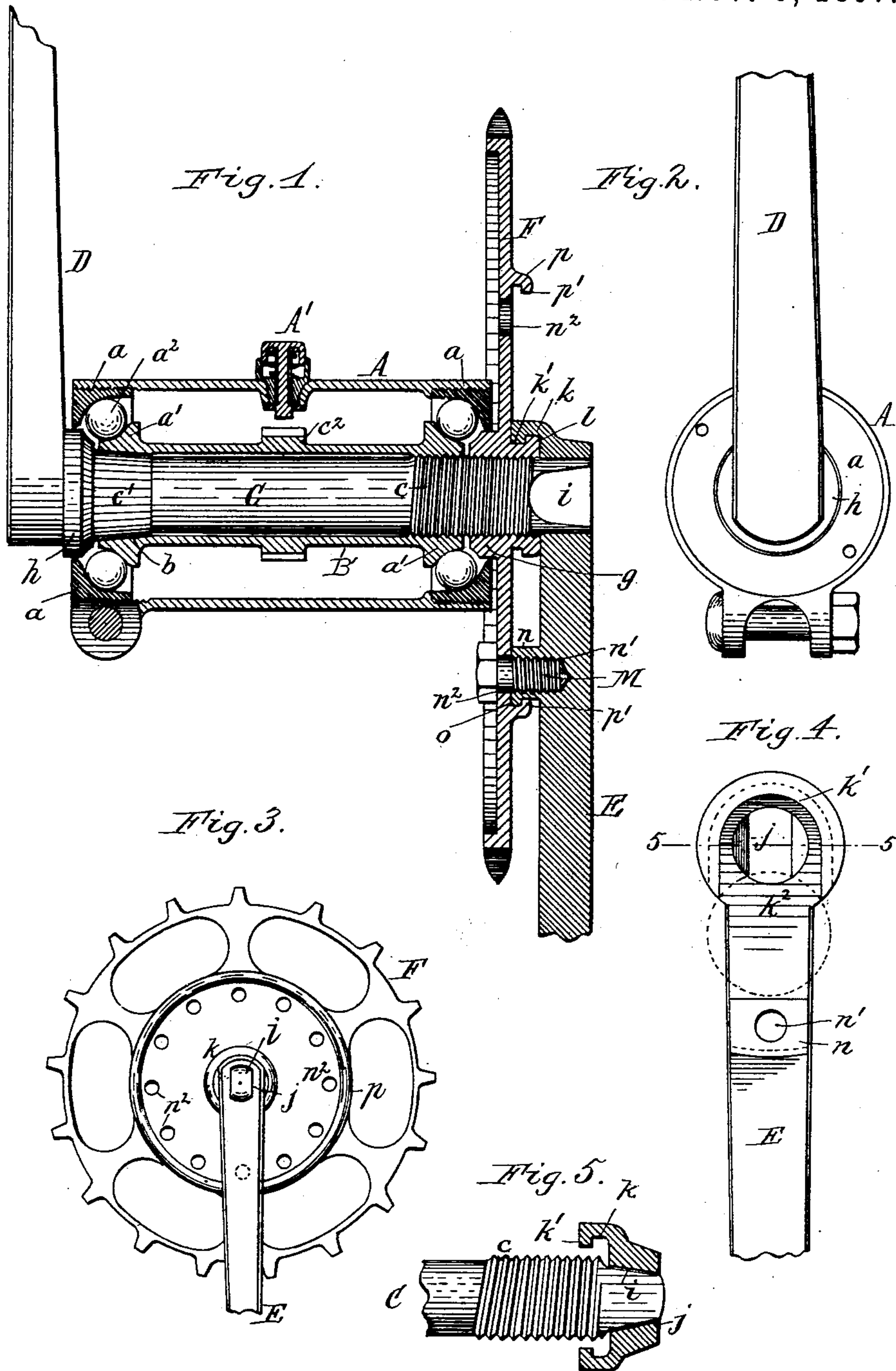
(No Model.)

2 Sheets—Sheet 1.

E. G. LATTA.
VELOCIPEDÉ.

No. 593,479.

Patented Nov. 9, 1897.



Witnesses:
F. Gustav Wilhelm
Henry L. Deck.

E. G. Latta Inventor.
By Wilhelm Thomsen
Attorneys.

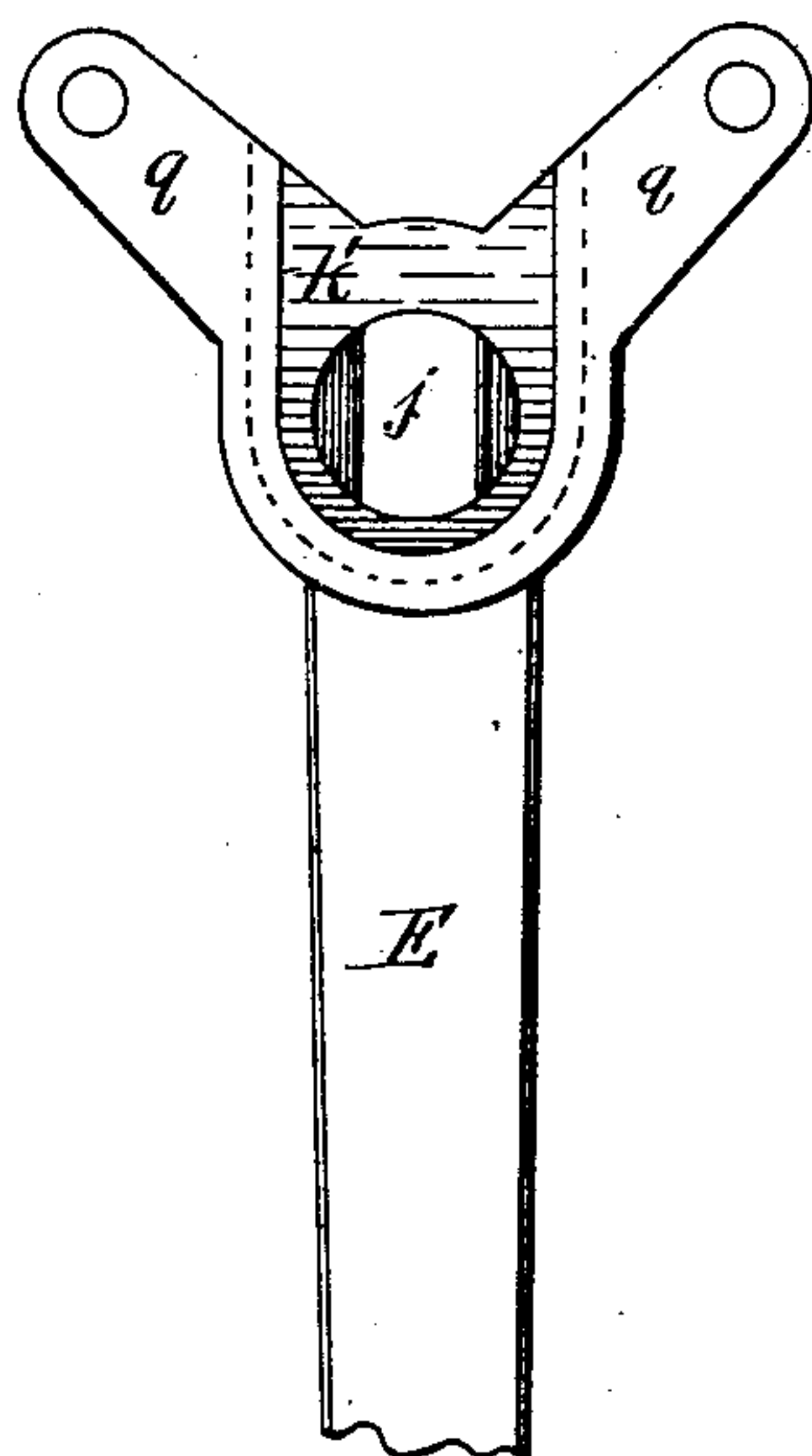
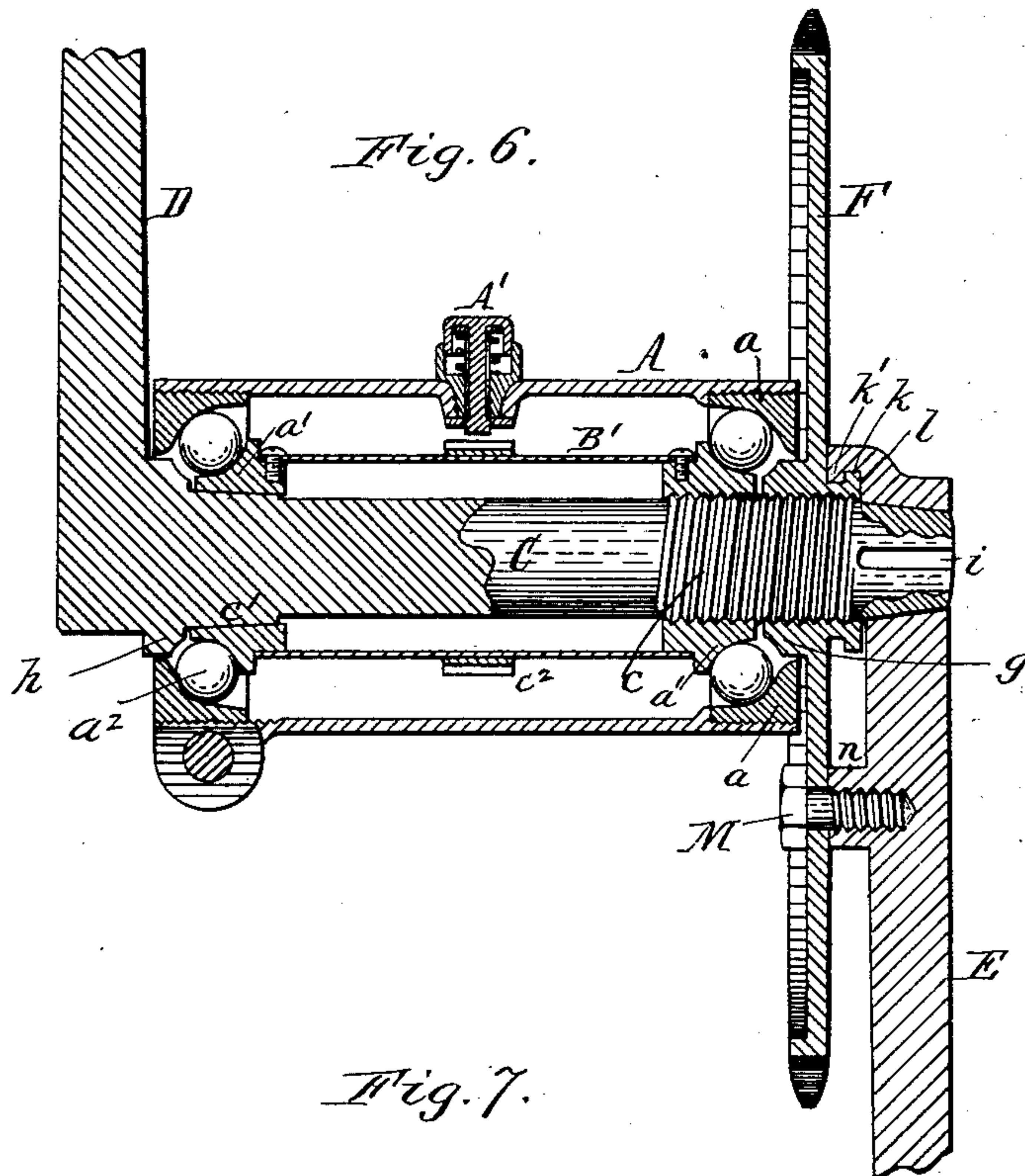
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2 Sheets—Sheet 2.

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VELOCIPÈDE.

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Patented Nov. 9, 1897.



Witnesses:
F. Gustav Wilhelm.
Henry L. Deck.

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UNITED STATES PATENT OFFICE.

EMMIT G. LATTA, OF FRIENDSHIP, NEW YORK.

VELOCIPEDÉ.

SPECIFICATION forming part of Letters Patent No. 593,479, dated November 9, 1897.

Application filed November 30, 1896. Serial No. 613,851. (No model.)

To all whom it may concern:

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

This invention relates to the means employed for connecting the cranks to the crank-shaft, and more particularly to a connection of this kind in which the sprocket or driving wheel is utilized for attaching the adjacent crank to the shaft.

The object of my invention is the production of a smooth, compact, and inexpensive construction of the cranks, crank-shaft, sprocket-wheel, and bearings which permits the easy connection and dismemberment of the parts without the use of special tools and without defacing their finish; also, to so arrange the various parts that the shaft can be detached without disturbing the bearings and so that the bearings can be inspected after withdrawing the shaft from the hanger or bracket without removing any part of the bearings.

In the accompanying drawings, consisting of two sheets, Figure 1 is a sectional elevation of a crank-shaft hanger and adjacent parts embodying my invention. Fig. 2 is an end view of the hanger and the permanent crank. Fig. 3 is a view, on a reduced scale, of the opposite end of the hanger, showing the sprocket-wheel. Fig. 4 is a detached elevation of the inner face of the detachable crank. Fig. 5 is a cross-section of said crank in line 5 5, Fig. 4, the same being shown in connection with the crank-shaft. Fig. 6 is a sectional elevation similar to Fig. 1, showing a modification of the improvement. Fig. 7 is an elevation of the inner face of the detachable crank, showing a modified construction thereof.

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

A is the crank-shaft hanger, which is of the usual tubular form and provided at each end with the customary bearing-cup *a*, a bearing-cone *a'*, and an interposed row of balls *a''*. The cups are preferably engaged with the hanger by screw-threads, as shown. The cones are connected by an intermediate sleeve

B', which may be formed integral therewith, as shown in Fig. 1.

C is the crank-shaft, arranged within the sleeve. One of the cranks, preferably the left-hand one, D, is formed in one piece with the shaft or permanently secured thereto, while the other crank, E, is detachably secured to the shaft. The shaft is provided at its right-hand end with an external screw-thread *c*, which engages with a corresponding thread formed at the adjacent end of the cone-sleeve B' and near its opposite end on the inner side of the permanent crank with a conical or tapering collar *c'*, which fits into a correspondingly-tapered portion *b* of the sleeve-bore. The screw-thread of the shaft has a left-hand pitch, so that the friction of the bearings tends to force the cone-sleeve toward the left, thereby wedging it firmly upon the conical seat or collar *c'* of the shaft and producing a tight fit at that end of the sleeve and at the same time preventing looseness at the opposite end of the sleeve by the binding of the screw-threads.

F is the sprocket or driving wheel, mounted on the crank-shaft between the detachable crank E and the adjacent end of the hanger and having an internal screw-thread which engages with the external thread *c* of the shaft, only a single screw-threaded portion of uniform size being thus required on the shaft for the sprocket-wheel and the cone-sleeve. The central openings of the bearing-cups *a* are larger than the shaft, and the annular space between the right-hand cup and the shaft is closed by the hub or inwardly-extending collar *g* of the sprocket-wheel, while the space between the opposite cup and the shaft is closed by a similar collar or hub *h*, formed on the shaft between the permanent crank and the tapering seat *c'* of the shaft. The hubs or collars *g h* are made of the same diameter, so that the bearing-cups may be made interchangeable. The right-hand end of the shaft and the portion thereof between its conical collar *c'* and the screw-thread *c* are preferably turned to the size of the smaller diameter of such screw-threads, as shown in Fig. 1. The end of the shaft just referred to is made tapering and flat-sided, as shown at *i*, and the hub of the detachable crank is formed with a correspondingly-shaped open-

ing j , which receives the end of the shaft, whereby the crank is held against turning on the shaft and firmly wedged upon its seat. The end of the shaft and the opening of the crank may have any other suitable angular form whereby the parts are reliably interlocked.

The crank hub or boss is provided on its inner face with an undercut recess or socket k , arranged in a parallel plane with the crank, as shown in Figs. 1, 4, and 5, and the hub of the sprocket-wheel is provided on its outer side with an outwardly-projecting annular flange l , which is seated in the recess or socket of the crank, so as to be overlapped by the lips k' , forming the overhanging portion of the undercut recess, thereby interlocking the crank with the sprocket-wheel and holding it against displacement lengthwise of the shaft. The socket of the crank is open on the side thereof facing the crank, as shown at k^2 , and this opening is of sufficient width to admit the annular flange l of the sprocket-wheel hub, as shown in Fig. 4, in which the flange of the hub is indicated by a dotted circle and represented as about to enter the socket of the crank.

M is a locking-bolt which connects the sprocket-wheel with the detachable crank for preventing loosening of the sprocket-wheel in back-pedaling. The crank is provided with a boss or stud n , having a screw-threaded opening n' , which receives the locking-bolt M , and the sprocket-wheel is provided in its web with an annular row of openings n^2 , arranged concentrically with the crank-shaft and so that any one of them can be registered with the opening of said boss by turning the sprocket-wheel on the shaft. The locking-bolt passes through one of these openings and into said boss.

In order to prevent the crank from springing away from the sprocket-wheel in forcing the crank upon the end of the shaft, the boss n of the crank is provided on its outer side with a projecting lip o , which interlocks with a flange p , projecting from the opposing outer side of the sprocket-wheel and having a lip or inwardly-turned edge p' , which overlaps the lip o , as shown in Fig. 1. The flange p of the sprocket-wheel is annular in form and arranged concentrically with the axis of the wheel, as shown in Fig. 3, so that the flange will interlock with the lip o of the crank in any position of the latter.

In assembling the parts the cone-sleeve B' and the balls a^2 and bearing-cups a are first placed in the hanger, and the crank-shaft is then inserted in the cone-sleeve from the left-hand end thereof and screwed into the threaded portion of the sleeve. Next the sprocket-wheel is placed with its flange l in front of the opening of the socket k in the crank-hub, as indicated by the dotted circle in Fig. 4, and said flange is then introduced into the socket by moving one part laterally on the other, which movement at the same time

causes the lip o of the crank to interlock with the annular flange p of the sprocket-wheel. The interlocked sprocket-wheel hub and crank-hub are next passed over the free end of the crank-shaft, whereby the flange of the sprocket-wheel hub is locked in the socket k of the crank, and the shaft is then held against turning and the sprocket screwed upon the shaft, thereby drawing the crank-hub firmly upon the tapered and flattened end of the shaft. If desired, the sprocket-wheel may be screwed upon the shaft by first placing the driving-chain on the wheel and connecting its ends and then turning the shaft by means of the cranks by riding the machine, thus drawing the detachable crank to its seat by what may be termed "screw-power" and dispensing with the use of a tool. After firmly securing the crank in place the latter and the sprocket-wheel are connected by the locking-bolt M , the sprocket-wheel being further turned by force, if necessary, to bring one of the openings of its web in line with the bolt-hole of the crank. If preferred, the parts may be assembled by first placing the left-hand bearing-cup upon the shaft with the balls in position and screwing the cone-sleeve upon the shaft, then inserting the shaft in the hanger and applying said cup to the end of the hanger, next putting in place the right-hand bearing-cup and the complementary balls, and finally applying the sprocket-wheel and the detachable crank to the shaft in the manner hereinbefore described.

To dismember the parts, the locking-bolt M is removed, the sprocket-wheel is then held against rotation and the cranks are turned backward, which causes the sprocket-wheel to unscrew from the shaft and at the same time force the detachable crank from the shaft by the positive shifting action of the screw connection. The cone-sleeve is next held against turning and the shaft is unscrewed therefrom by turning the permanent or left-hand crank and withdrawn from the sleeve, leaving the sleeve and the bearings undisturbed. During this operation the cone-sleeve is held against turning from the outside of the bracket by any suitable means. For instance, this may be done by means of a spring-bolt A' , which is arranged to slide radially in the hanger and which is interlocked with a notched or flat-sided collar c^2 , arranged on the cone-sleeve, by pressing the spring-bolt inwardly into engagement with said collar. The spring of this locking-bolt normally draws the bolt into the position in which it clears the collar of the cone-sleeve, as shown in Fig. 1. As the collars g h are removed with the shaft and the sprocket-wheel the balls are exposed and can be inspected without disturbing the bearing cups or cones. Should it be desired to remove the bearings from the hanger the left-hand cup is unscrewed from the hanger, whereupon the sleeve can be withdrawn from the hanger. The same method may be followed in case the cone-sleeve should

become bound on the shaft so tightly that the shaft cannot be easily unscrewed therefrom.

My improved construction has the following advantages: The parts are strong and few in number. They are easily made by ordinary methods from drop-forgings. The shaft is of small diameter and does not require hardening and it passes entirely through the hub of the sprocket-wheel and the detachable crank, insuring a reliable connection of these parts. The bearing-cones can be replaced if defective or broken. The parts can be connected and detached without special tools and without liability of marring the finish. The flange of the sprocket-wheel forms a support for the same which affords additional security. The shaft may be detached without disturbing the bearings or the latter may be detached with the shaft, as desired, and the complete hanger is free from projecting parts. It is light and compact in build and can be made at comparatively small cost.

If desired, the cones may be made separate and connected by a piece of tubing B', which is secured to the cones by screws or other suitable means, as shown in Fig. 6. This figure also shows a modification in which the interlocking lips *op* of the crank and sprocket-wheel employed in the first-described construction are omitted.

In the modified construction of the detachable crank shown in Fig. 7 the same is provided on the side of its hub opposite the crank-arm with a pair of radial arms *q*, which are perforated for the passage of locking-bolts, whereby the sprocket-wheel is secured to the crank, these bolts being used in place of the single bolt M. (Shown in the construction previously described.) In this case the

socket *k'* of the crank opens in a contrary direction to that shown in the construction of Figs. 1 to 5. If desired, the crank shown in Fig. 7 may be used in connection with the sprocket-wheel of the first-described construction.

I claim as my invention—

1. The combination with an externally-screw-threaded crank-shaft having an angular end portion, of a sprocket-wheel hub having a screw-threaded bore engaging with the screw-thread of the shaft, and provided on its outer side with an outwardly-projecting flange, and a crank having its hub provided with an angular opening receiving the end portion of the shaft and an undercut socket or recess arranged on the inner side of the crank and receiving the flange of the sprocket-wheel hub, and having an opening in one side thereof for admitting the flange of the sprocket-wheel hub, substantially as set forth.

2. The combination with a hanger, of a crank-shaft journaled in the hanger and having a permanent crank and a tapering collar or enlargement at one end thereof, a detachable crank at its opposite end and an external screw-thread adjacent to the detachable crank and a sleeve surrounding the shaft, carrying a bearing-cone at each end and provided at one end with an internal screw-thread engaging with the screw-thread of the shaft and having the opposite end of its bore tapered to fit the tapering collar of the shaft, substantially as set forth.

Witness my hand this 24th day of November, 1896.

EMMIT G. LATTA.

Witnesses:

H. L. BLOSSOM,
C. J. RICE.