

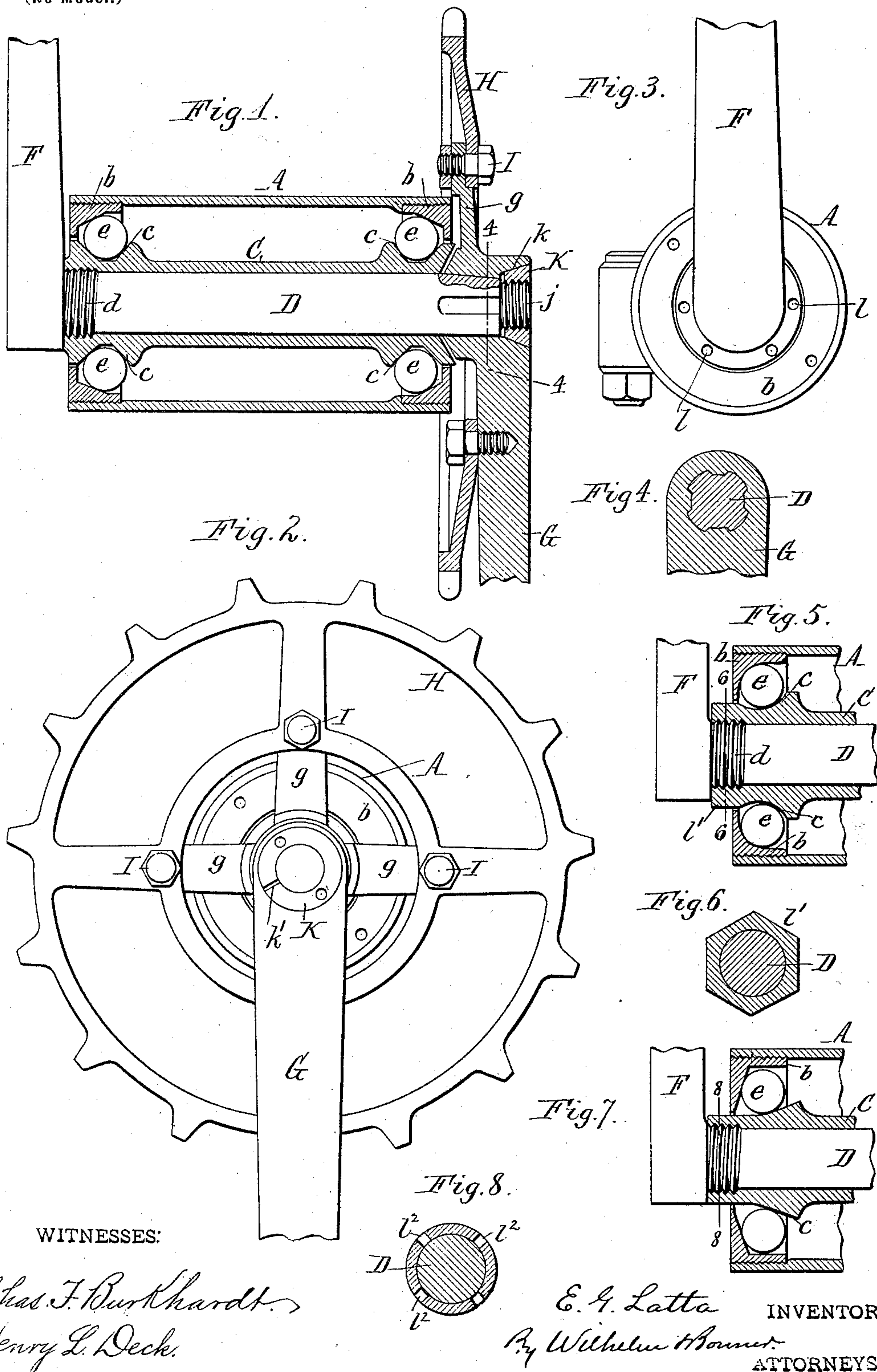
No. 638,021.

Patented Nov. 28, 1899.

E. G. LATTA.  
VELOCIPEDE CRANK SHAFT.

(Application filed Sept. 21, 1896.)

(No Model.)



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## VELOCIPED CRANK-SHAFT.

SPECIFICATION forming part of Letters Patent No. 638,021, dated November 28, 1899.

Application filed September 21, 1896. Serial No. 606,482. (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 a new and useful Improvement in Velocipede Crank-Shafts, of which the following is a specification.

This invention has more especial reference to that class of velocipede crank-shafts which are provided at one end with a permanent crank and at the other end with a detachable crank.

The object of my invention is to provide a construction of the crank-shaft and cranks which comprises few parts, possesses great strength, and produces a close build and which permits the ready assemblage and dismemberment of the parts without the use of special tools or projecting keys and without liability of marring or defacing the finish of the parts.

In the accompanying drawings, Figure 1 is a sectional elevation of the crank-shaft and adjacent parts. Fig. 2 is an elevation of the crank-shaft hanger and the parts supported thereby viewed from the end at which the sprocket-wheel is arranged. Fig. 3 is a similar elevation viewed from the opposite end of the hanger. Fig. 4 is a cross-section in line 4 4, Fig. 1. Fig. 5 is a fragmentary sectional elevation of the bracket and crank-shaft, showing a modification of the invention. Fig. 6 is a cross-section in line 6 6, Fig. 5. Fig. 7 is a fragmentary sectional elevation of another modified construction. Fig. 8 is a cross-section in line 8 8, Fig. 7.

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

A is the crank-shaft hanger or bracket, which is of the usual cylindrical form and provided in its ends with the bearing-cups *b*.

C is the rotary bearing-sleeve, which is journaled in the hanger and which supports the crank-shaft D. This bearing-sleeve is provided at its ends with suitable cones *c*, between which and the cups *b* the balls *e* are arranged, these cones being formed integral with the sleeve or made separate therefrom and rigidly secured thereto. The crank-shaft is fitted closely within the bearing-sleeve and held against endwise displacement therein by an external screw-thread *d*, formed on the

shaft, preferably on its left-hand portion, and engaging with a corresponding thread on the sleeve.

One of the cranks, preferably the left-hand crank F, is formed in one piece with the shaft or permanently secured thereto, while the other crank G is detachably secured to the shaft.

H is the sprocket or driving wheel, which is secured to the right-hand crank, the hub of the latter having the usual radial arms or lugs *g*, to which the arms of the sprocket-wheel are secured by bolts I.

The portion of the crank-shaft on which the hub of the detachable crank is seated is tapered and corrugated or made of angular cross-section, as shown in Figs. 1 and 4, and the bore of the crank-hub is correspondingly shaped, so that the crank is reliably interlocked with the shaft when forced upon its seat. The end of the shaft is reduced and provided with an external screw-thread *j*, and to this screw-threaded end a clamping-nut K is applied, which is preferably countersunk in a socket or recess *k*, formed in the outer face of the crank-boss. This nut is split, as shown at *k'* in Fig. 2, and is provided with a conical or tapering outer surface, as shown in Fig. 1, while the socket *k* of the crank-boss is correspondingly tapered, so that upon tightening the nut it is wedged into its seat and compressed, causing the same to tightly grasp the screw-threaded end of the shaft and effectually preventing loosening thereof. By this construction the clamping-nut also serves as an adjustable center bearing for the outer portion of the crank-boss, whereby the latter is reliably held at right angles to the crank-shaft. As the detachable crank carries the sprocket-wheel, this is an important feature, because unless the boss is accurately mounted on the shaft the driving-chain will run unevenly. The split clamping-nut thus serves the double function of forcing the crank-boss upon its seat and retaining it thereon and of assisting in centering the same on the shaft.

The left-hand end of the bearing-sleeve is extended outwardly beyond the adjacent ball-race, and its end is formed to receive a suitable wrench for turning the same. The preferred construction consists in making the sleeve substantially flush with the end of the



hanger and providing the same in its end with pin-holes  $l$  for the reception of a pin-wrench, as shown in Fig. 3. If desired, however, the end of the sleeve may be provided with a hexagonal or other flat-sided extension  $l'$ , as shown in Figs. 5 and 6, or it may be likewise extended and simply provided in its peripheral surface with openings  $l^2$  for engagement with a pin-wrench, as shown in Figs. 7 and 8.

10 In assembling the parts the bearing-sleeve, the cups  $b$ , and the balls are first placed in position in the hanger. The crank-shaft is then placed into the sleeve, the sleeve is held against turning, and the shaft is turned by  
15 means of the permanent crank, so as to engage its left-hand screw-thread  $d$  with the threaded portion of the sleeve, the shaft being screwed into the sleeve until the permanent crank abuts against the adjacent end of the sleeve. The sleeve and shaft are preferably connected by a left-hand thread, so that the friction of the bearings tends to retain the sleeve against the permanent crank. Next the detachable crank is placed upon the opposite end of the shaft, and then the split nut  
25 K is applied to the end of the shaft and tightened, whereby the detachable crank is firmly forced upon its seat on the shaft.

The joint between the shaft and the detachable crank being tapered, a small space must be left between the crank-boss and the adjacent end of the bearing-sleeve to afford the requisite lateral movement of the boss on the shaft in clamping and adjusting it.

30 In order to dismember the parts, the split nut K is first removed from the shaft. The shaft is then held against turning and the sleeve is unscrewed from the shaft, or, in other words, is turned in the direction in which it causes the shaft to be shifted toward the left, the shaft being compelled to move lengthwise in the sleeve, because the latter is held against endwise movement by the bearings. This longitudinal movement of the  
40 shaft causes the boss of the detachable crank to be drawn against the adjacent end of the sleeve, whereby the crank is forced from its seat. By this means the detachable crank is loosened without the use of special tools and

without defacing the parts. After detaching 50 the separable crank the shaft can be removed from the sleeve, leaving the latter and the bearings intact.

In my improved crank-shaft the parts are few and strong. No brazed joints and no projecting parts, such as keys, nuts, or cotter-pins are employed. The bearings are of the most approved design, and a broken crank can be replaced or a bent one removed and repaired without requiring skilled labor or the use of special appliances. 60

I claim as my invention—

1. The combination with a hanger or bracket, of a one-piece crank-shaft having an external screw-thread and provided at one end with a detachable member which is mounted on the shaft to rotate therewith and is detachable therefrom, and a bearing-sleeve surrounding the shaft between the cranks, capable of rotation independently of the shaft 70 and having an internal screw-thread engaging with the screw-thread of the shaft, whereby the shaft is caused to move lengthwise in the sleeve, for loosening the detachable member, upon turning the sleeve relatively to the shaft, substantially as set forth. 75

2. The combination with a hanger or bracket having bearing-cups in its ends, of a crank-shaft having an external screw-thread and provided at one end with a detachable crank, and a bearing-sleeve surrounding the crank-shaft, having an internal screw-thread engaging with the screw-thread of the shaft and carrying a pair of cones which are independent of the cranks and rigidly connected by the sleeve, the sleeve being capable of rotation independently of the shaft and having one of its ends extended through the adjacent bearing-cup and constructed to receive a wrench for turning the sleeve, substantially as set forth. 80 85 90

Witness my hand this 17th day of September, 1896.

EMMIT G. LATTA.

Witnesses:

A. B. VORHES, Jr.,  
C. J. RICE.