No. 711,057. Patented Oct. 14, 1902.

E. G. LATTA.

CRANK SHAFT AND HANGER FOR VELOCIPEDES.

(Application filed Mar. 24, 1896.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

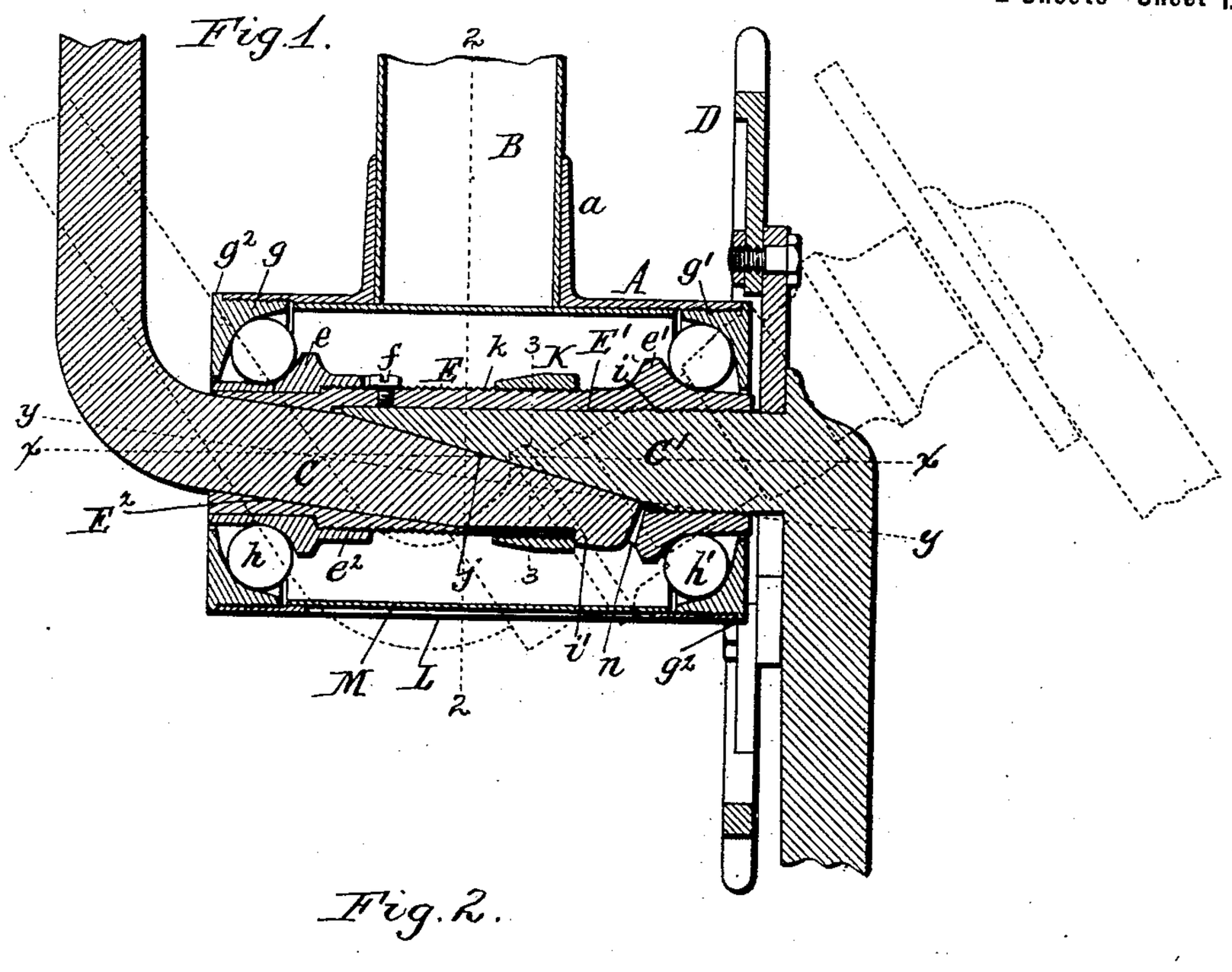
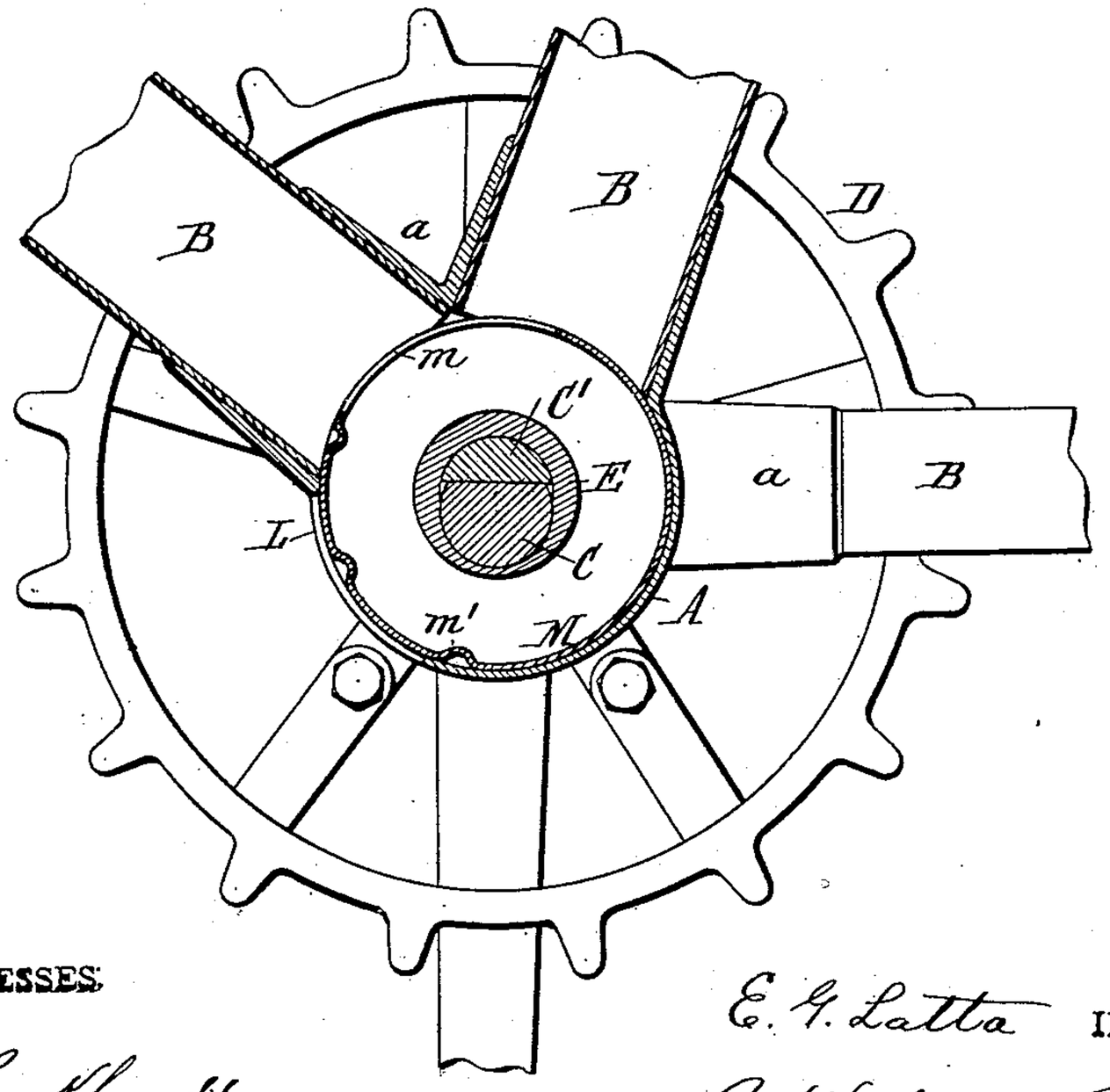


Fig. 2.



WITNESSES:

Chas. F. Burkhardt.

Theo. L. Popp.

E. G. Latta INVENTOR.

By Wilhelm & Bonner.

ATTORNEYS.

No. 711,057. Patented Oct. 14, 1902.

E. G. LATTA.

CRANK SHAFT AND HANGER FOR VELOCIPEDES.

(Application filed Mar. 24, 1896.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

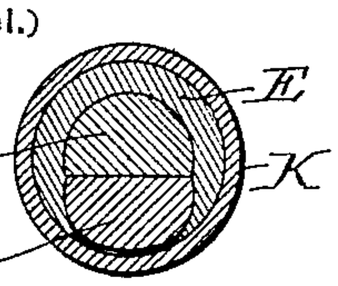


Fig. 4.

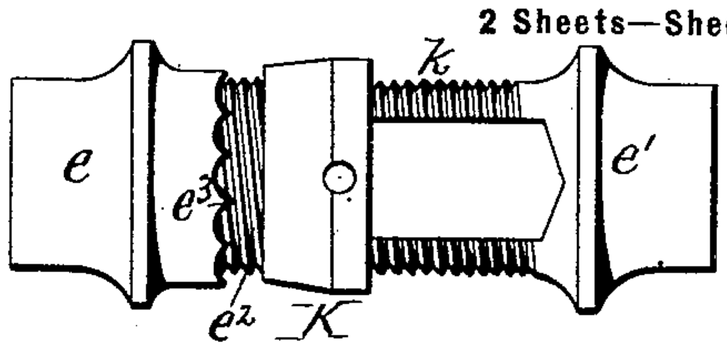


Fig. 5.

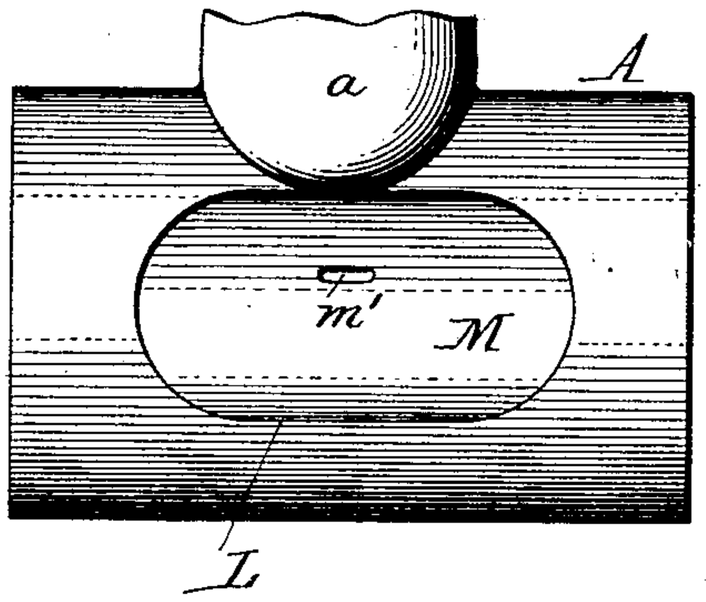


Fig. 6.

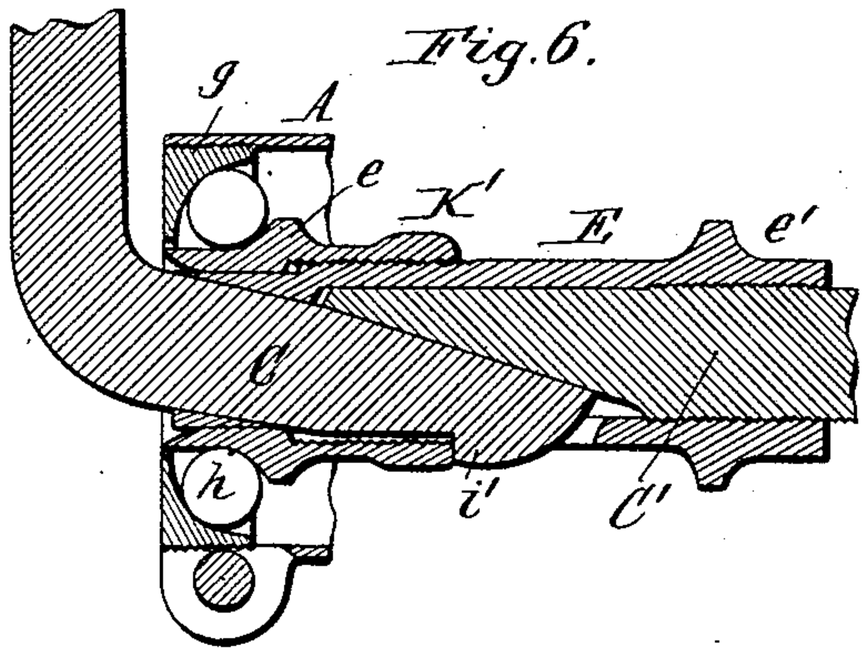


Fig. 7.

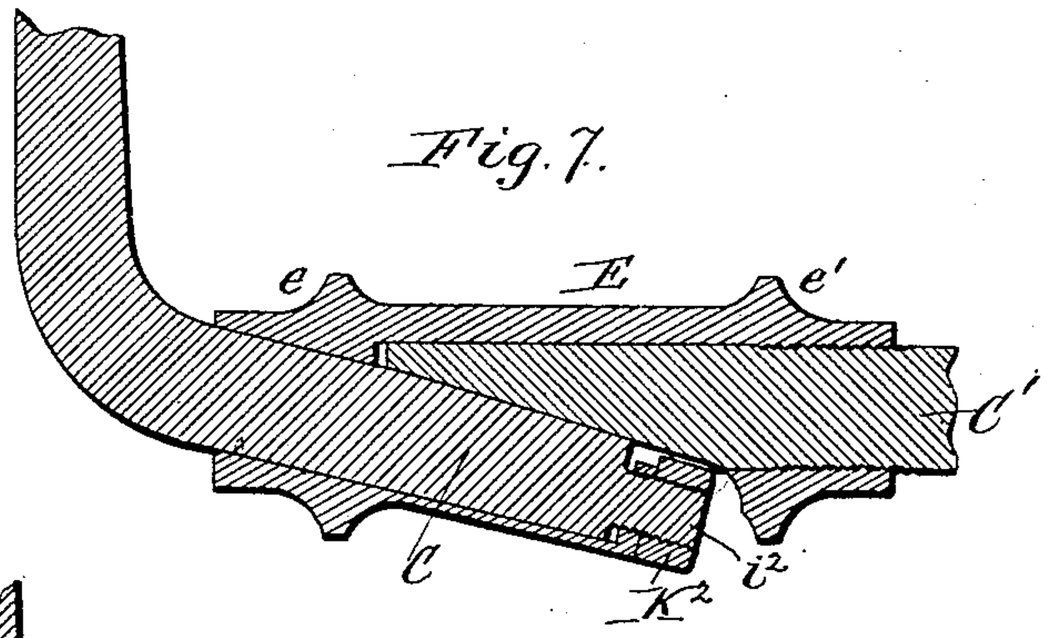


Fig. 8.

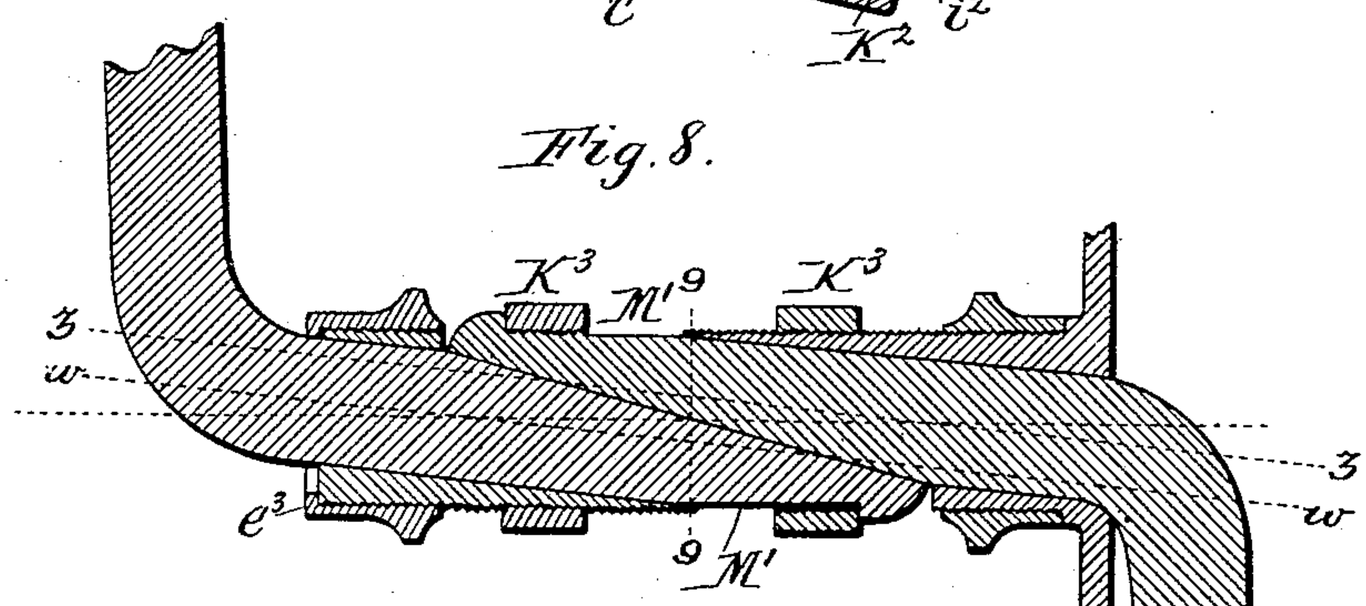
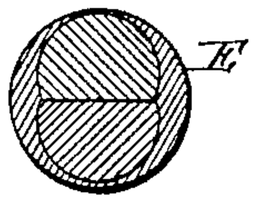


Fig. 9.



WITNESSES:

Chas. F. Burkhardt.

Theo. L. Popp.

E. G. Latta INVENTOR.

By Wilhelm & Brimes

ATTORNEYS.

UNITED STATES PATENT OFFICE.

EMMIT G. LATTA, OF FRIENDSHIP, NEW YORK.

CRANK SHAFT AND HANGER FOR VELOCIPEDES.

SPECIFICATION forming part of Letters Patent No. 711,057, dated October 14, 1902.

Application filed March 24, 1896. Serial No. 584,630. (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 Crank Shafts and Hangers for Velocipedes, of which the following is a specification.

This invention relates to that class of velocipede crank-shafts which are composed of two sections rigidly connected by a rotary coupling or sleeve which is supported in the hanger or bracket by ball-bearings, each shaft-section carrying an integral or permanent crank.

My invention has for its object to produce a construction in which the shaft, the cranks, and the hanger are smooth and sightly in outward form and which permits the crank-shaft to be removed from the hanger without disconnecting its sections or cranks and without disturbing the adjustment of the ball-bearings or permits the detachment of the cranks without removing the shaft-coupling from the hanger.

The invention also has the object to so construct the parts that the coupled shaft can be applied to a hanger of suitable length without increasing the diameter of the hanger.

In the accompanying drawings, consisting of two sheets, Figure 1 is a sectional elevation of the hanger and the crank-shaft. Fig. 2 is a transverse section in line 2 2, Fig. 1. Fig. 3 is a similar section of the shaft and coupling in line 3 3, Fig. 1. Fig. 4 is a detached elevation of the coupling, showing the lock-nut in position to permit the insertion of the shaft. Fig. 5 is a side elevation of the hanger, showing the opening in its side and the cover for the opening. Figs. 6, 7, and 8 are sectional elevations of modifications of my improvement. Fig. 9 is a cross-section in line 9 9, Fig. 8.

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

A is the crank-shaft hanger or bracket constructed of the usual cylindrical form and having the customary sockets or thimbles *a* for the attachment of the frame members B of the machine.

C C′ are the sections of the divided crank-shaft, each of which carries one of the cranks, which may be formed integrally with the shaft-section or permanently secured thereto.

D is the sprocket-wheel, which is secured to one of the sections and a flange of the adjacent crank by brazing or otherwise.

E is the coupling or sleeve connecting the shaft-sections and having bearing-cones *e e′* at opposite ends thereof, one of the same being preferably formed in one piece with the sleeve and the other mounted adjustably thereon by means of a screw-thread e^2, as shown in Fig. 1. This adjustable cone is held in position by a screw *f*, arranged on the coupling-sleeve and engaging with its head in one of an annular series of locking-notches e^3, formed in the inner edge of the cone.

g g′ are the bearing-cups arranged in the ends of the hanger and preferably secured therein by screw-threads formed on the respective parts, each cup having a shoulder g^2, which abuts against the end of the bracket.

h h′ represent the rows of balls interposed between the two sets of bearing cups and cones.

A portion E′ of the bore of the coupling-sleeve is arranged parallel with the axis thereof to form an axial seat or socket for one of the shaft-sections, while the other portion E^2 of the sleeve-bore is arranged obliquely to its axis or at an angle to its axial seat to form an oblique seat or socket for the other shaft-section, the two seats or portions of the bore intersecting each other, as indicated by the dotted lines *x x* and *y y* in Fig. 1. For this purpose the center of the sleeve is bored out on the line *x x* for about four-fifths of its length from the right-hand or sprocket-wheel end thereof, and it is bored for a similar distance from its opposite end on the line *y y*, the latter or oblique bore extending through the side of the coupling-sleeve, as shown in Figs. 1 and 4. The axial or right-hand shaft-section is provided near its outer end with an external screw-thread *i*, which engages with an internal thread of the coupling-sleeve. The other shaft-section is smooth or unthreaded, and its inner end projects through the opening in the side of the coupling-sleeve and is formed with a locking-shoulder *i′*. The inner or contiguous portions of the two sections are chamfered, as shown at *j*, or are otherwise formed so as to interlock with each

other. Obviously the shaft-section C′ may be secured in the coupling-sleeve by brazing or other desired means or may be constructed integral therewith without departing from the principle of my invention.

K is a locking device applied to the coupling-sleeve between its bearing-cones and engaging with the shoulder of the oblique shaft-section C, so as to confine the latter in its seat in the coupling-sleeve, thereby also preventing unscrewing of the other shaft-section. The preferred locking means shown in the drawings consists of a screw-nut or internally-screw-threaded collar, which engages with an external thread *k* of the coupling-sleeve and bears against the shoulder of the shaft-section C, so that upon turning this nut in the proper direction said shaft-section is drawn into the sleeve and tightly secured therein.

The hanger or bracket is provided in one side with an opening L, adapted to receive the bend of one of the cranks in passing the coupled shaft-sections obliquely into the hanger. This opening is normally closed by a movable lining or cover M, which is preferably cylindrical and provided with a corresponding aperture *m*, adapted to coincide with the opening of the hanger in inserting the shaft and to be moved out of register therewith after inserting the shaft, so as to close the opening, as shown in the drawings. For this purpose the cylindrical lining or cover is free to rotate in the hanger and is provided with a circumferential row of depressions or indentations *m′*, one or more of which are exposed through the opening of the hanger, as shown in Figs. 2 and 5, and whereby the lining can be turned.

In assembling the parts the right-hand bearing-cup *g′* is passed over the shaft-section carrying the sprocket-wheel and the complementary balls are placed in the same. This shaft-section is next screwed into the coupling-sleeve to its full limit, and the lock-nut K and the adjustable bearing-cone *e* are screwed upon their seats on the sleeve to the position shown in Fig. 4, after which the left-hand shaft-section is inserted in its seat in the sleeve until its shoulder arrives in line with the inner edge of the lock-nut K. The latter being now screwed toward the right-hand end of the sleeve forces the oblique shaft-section firmly into its seat and retains it in position, at the same time causing said section to hold the previously-inserted shaft-section against turning, thereby preventing unscrewing thereof. The cover or lining M of the hanger is next turned to uncover its side opening L, and the left-hand crank of the coupled shaft is passed through the hanger and the shaft inserted therein, the shaft being introduced obliquely and the bend of the advancing crank projecting through the opening of the hanger during this operation, as shown by dotted lines in Fig. 1. After inserting the shaft the right-hand bearing-cup *g′* is screwed into place in the end of the hanger, the left-hand cup is passed over the corresponding crank, its complementary balls are put in place, and the cup is then screwed into the adjacent end of the hanger. The bearings are next adjusted by means of the movable cone *e*, the latter is locked in position by the screw *f*, and finally the side opening of the hanger is closed by the cover M. By performing these various operations in the reverse order the shaft is detached from the hanger and its parts are disconnected.

As the shouldered bearing-cups abut against the ends of the hanger they are always arrested at the same points, and the crank-shaft may be removed from the hanger and replaced therein without disturbing the adjustment of the movable cone *e*, or the shaft-sections, if bent or broken, may be removed without unscrewing the bearing-cups or otherwise affecting the bearings by simply uncovering the side opening of the hanger, unscrewing the lock-nut K, and driving a nail or other suitable implement into the opening or space *n* between the end of the oblique shaft-section C and the right-hand bearing-cone *e′*, whereby said shaft-section is forced outward and released, thus permitting the other shaft-section to be unscrewed from the coupling-sleeve and detaching the parts. This is a desirable feature of my improved construction, as it permits the ready detachment of the injured or unserviceable part without dismembering the whole structure, it being unsatisfactory to uncouple the shaft-sections every time the bearings require inspection or to unscrew the bearing-cups in order to remove a bent crank.

As the oblique or locking section of the crank-shaft crosses the axial line of the coupling-sleeve it has a tendency to rotate the sleeve by reason of such intersection. This materially relieves the locking-joint from the rotary strains applied to the left-hand crank, and as the sprocket-wheel is secured to the right-hand crank the joint receives little strain from the latter. This construction has the further important advantage that the shaft-sections are considerably stronger at the middle of their interlocking or contiguous portions than they could possibly be if they were both located in the axial line of the sleeve. In other words, the meeting portions of the sections are thicker or of greater cross-sectional area than they would be if they were both arranged wholly within the sleeve, it being obvious that where two sections have uniformly-beveled ends, both meeting wholly within the sleeve and on the same axial line, there must be a point where each section possesses only one-half the strength of the unreduced body of the sections. In my improved construction the reduced portion of each shaft-section is thicker than half the diameter of the body of the section, as shown in Figs. 1 and 3, and hence it possesses correspondingly-greater strength, thus greatly

lessening the danger of breakage at this point or enabling the same strength as that of a shaft with two axially-arranged sections to be obtained with a shaft of smaller diameter.

A hanger of the construction herein shown and described is equally desirable for a non-sectional shaft or one in which the shaft and the cranks are formed in one piece.

The modified construction shown in Fig. 6 is like that shown in Figs. 1 to 5, except that the lock-nut K′ is formed in one piece with the adjustable cone *e*, the latter being extended for this purpose and bearing at its inner end against the shoulder of the oblique shaft-section. This construction requires the adjustment of the bearings to be made by the left-hand bearing-cup, or, if desired, the right-hand cone may be made adjustable for this purpose. As the adjustable cone shown in Fig. 6 moves outward on the coupling-sleeve in unlocking the oblique shaft-section, it is necessary to unscrew the adjacent bearing-cup at the same time.

In the modified construction of the improvement shown in Fig. 7 the right-hand shaft-section is engaged in the sleeve-coupling by a screw-thread, as in the foregoing constructions; but the other section instead of being locked in the sleeve by a nut or collar surrounding the latter is secured in place by an ordinary screw-nut K^2, applied to a reduced screw-stem i^2 of the oblique shaft-section and bearing against the inner end of the offset portion of the sleeve, which forms part of the oblique seat of said section. The bearing-cones are in this modification made integral with the coupling-sleeve, and the bearing is adjusted in the same manner as in the construction of Fig. 6.

Figs. 8 and 9 show a modification in which both shaft-sections are arranged obliquely in the sleeve, but parallel with each other, as indicated by the dotted lines *z z* and *w w*, which pass axially through the shaft-sections, respectively. In this construction neither of the shaft-sections is screw-threaded, and each is provided with a locking-shoulder. The coupling-sleeve is formed with two side openings M′ for the shouldered ends of the sections, and each section is confined in place in the sleeve by a separate lock nut or collar K^3, like that shown in Figs. 1 to 5. The hub of the sprocket-wheel is in this case integral with the coupling-sleeve or rigidly secured thereto. This is necessary because if the shaft-section on the same side as the sprocket-wheel were made adjustable in the coupling-sleeve on a line intersecting the axis of the sleeve it would be difficult to fit the sprocket-wheel to said shaft-section and bring it to the true center. By mounting the sprocket-wheel on the sleeve it is immaterial whether the shaft-section is inserted to a certain point or not. This construction also has the advantage of enabling both shaft-sections and their cranks to be made alike, which is an important consideration in the manufacture of the shaft. In this modification the coupling-sleeve is provided with an external right-hand screw-thread extending from the sprocket-wheel to its opposite end, and the right-hand bearing-cone abuts against the sprocket-wheel, while the other has an annular lip e^3, which overlaps the adjacent end of the sleeve and limits the inward movement of the cone. In coupling the shaft-section of this construction the right-hand bearing-cup is first passed over the coupling-sleeve and the corresponding balls are placed therein. Then the two bearing-cones and the locking-collars are placed on the sleeve, both collars being screwed to one side of the middle of the coupling. One of the shaft-sections is next inserted in the sleeve from the same end on which the two locking-collars are arranged, so as to allow the shoulder of the section to pass through both collars. The collars are then both screwed to the opposite side of the sleeve-center and the other shaft-section is inserted, after which the collars are screwed in opposite directions toward the ends of the sleeve, whereby the sections are firmly forced into place and interlocked with each other. This construction permits either of the shaft-sections to be detached without disturbing the other.

In all of the several constructions described the coupling or sleeve is caused to turn with the coupled shaft without the use of separate fastening devices, and it is held as securely in one direction as in the other, thus preventing loosening of the parts in back-pedaling.

I claim as my invention—

1. The combination with a hanger-sleeve or bracket, of a two-part or separable crank-shaft mounted to rotate therein, one part of which has its central axis parallel with that of the bracket and carries the inner bearing member of a ball-bearing, and the other part of which is integral with its crank-arm and is arranged with its central axis oblique to the axis of the bracket, said part which carries the bearing member being provided with a socket the central axis of which is inclined to that of the bracket and is adapted to receive the other or oblique section, substantially as set forth.

2. The combination with a tubular bracket of a sleeve mounted to rotate therein and two crank-arms having shaft-sections integral therewith; said crank-sections being inserted in sockets in the sleeve and arranged in overlapped relation within the sleeve and having flat contact-faces on their overlapping parts and one of said sections being arranged obliquely with respect to the central axis of the sleeve.

3. The combination with a hanger-sleeve or bracket, of a two-part or separable crank-shaft mounted to rotate therein, one part of which has its central axis parallel with that of the bracket and carries the inner bearing member of a ball-bearing and the other part of which is integral with its crank-arm and is

arranged with its central axis oblique to the axis of the bracket, said part which carries the bearing member being provided with a socket the central axis of which is inclined to that of the bracket and receives the other or oblique shaft-section, the shaft-sections overlapping, substantially as set forth.

4. The combination with a hanger or bracket, of a rigid crank-shaft coupling journaled in said bracket and having two stationary seats or bores, one of which is arranged at an angle to the axis of the coupling and a sectional shaft having one of its sections rigidly held in the angular or oblique seat of said coupling and extending through the side thereof and its opposite section rigidly held in the other seat of the coupling.

5. The combination with a hanger or bracket and a sectional crank-shaft, of a coupling-sleeve, rigidly connecting the shaft-sections and provided with a pair of stationary seats or bores, one of which extends through the side of the coupling, intersecting each other and in which the shaft-sections are rigidly secured.

6. The combination with a hanger or bracket, of a rigid crank-shaft coupling journaled in said bracket and provided with an axial seat or bore and an oblique seat or bore intersecting said axial seat and crank-shaft sections rigidly held in said axial and oblique seats respectively, the crank-shaft section in the oblique seat extending through the side of the coupling.

7. The combination with a shaft having interlocking sections, of a coupling provided on opposite sides of its middle with bearing-cones and between said cones with an opening through which one of the shaft-sections projects, and a lock-nut or collar mounted on the coupling between said cones and engaging with the projecting portion of said shaft-section.

8. The combination with a shaft composed of interlocking sections, one of which is provided at its inner end with a locking-shoulder, of a coupling having an oblique bore extending through the wall thereof, and receiving said shouldered shaft-section and a lock-nut or collar surrounding the coupling and engaging against the shoulder of said section.

9. The combination with a shaft-coupling carrying bearing-cones on its end portions, of a crank-shaft composed of interlocking sections one of which is arranged to slide lengthwise in the coupling and the other of which engages with the sleeve by a screw-thread, and a screw-threaded locking device mounted on the coupling between the cones and movable independently thereof, and operating to draw the sliding shaft-section into the coupling, without requiring the coupling or the shaft-sections to be turned.

10. The combination with a crank-shaft having permanent cranks, of a tubular hanger provided with integral, unbroken end portions through which the cranks and shaft can be inserted endwise and between said unbroken end portions with an opening through which one of the shaft-bends is projected in inserting the shaft and cranks into the hanger.

11. The combination with a hanger or bracket, of a rigid crank-shaft coupling journaled in said bracket and having two stationary seats or bores one of which is arranged at an angle to the axis of the coupling and a sectional shaft having one of its sections rigidly held in the angular seat of said coupling with its inner end in interlocking engagement with the wall of said coupling and the opposite section of said shaft being rigidly held in the other seat of said coupling.

Witness my hand this 18th day of March, 1896.

EMMIT G. LATTA.

Witnesses:
M. W. POTTER,
C. J. RICE.