

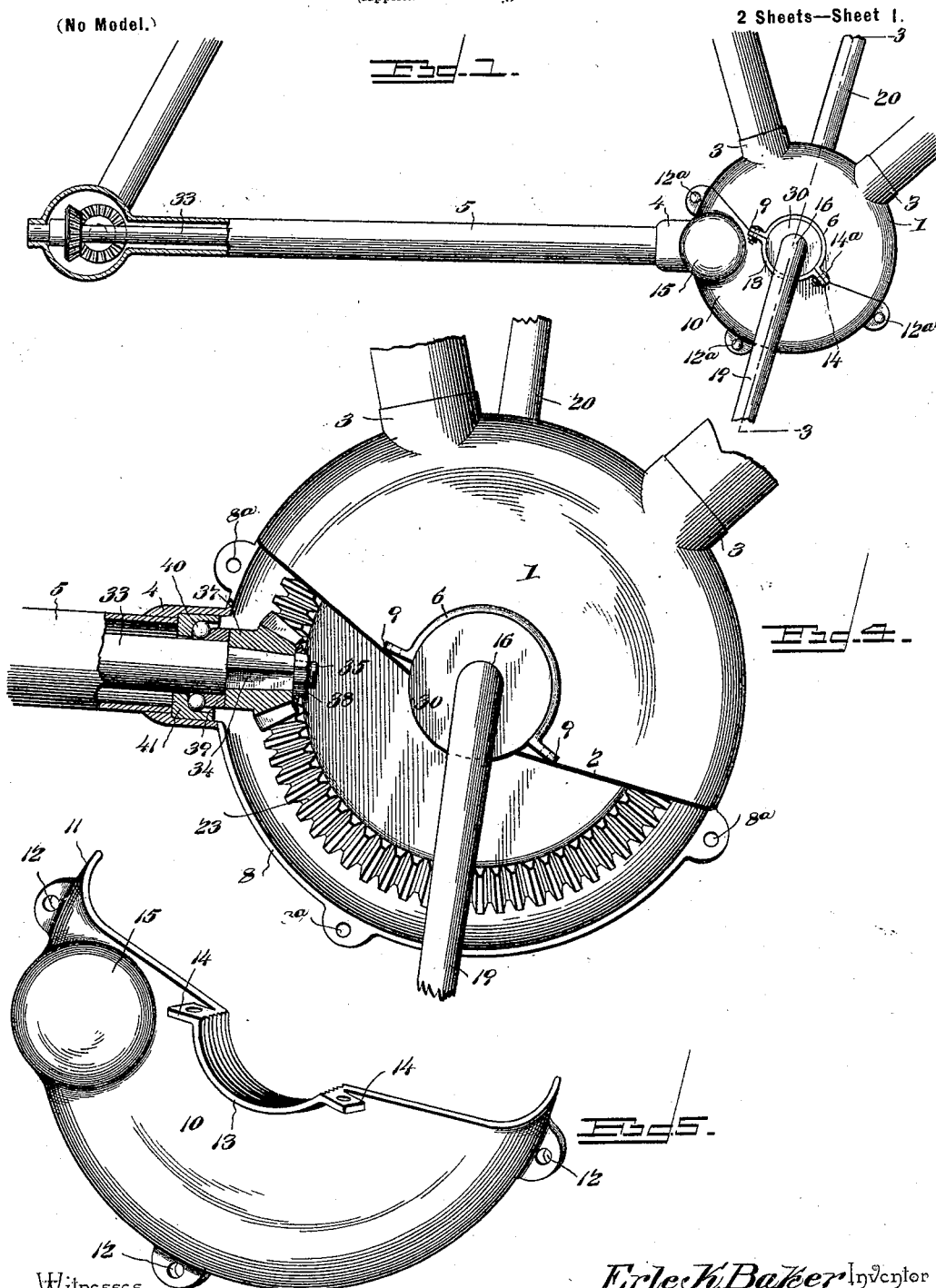
No. 645,540.

Patented Mar. 20, 1900.

E. K. BAKER.
CHAINLESS BICYCLE.

(Application filed Aug. 23, 1898.)

(No Model.)



Witnesses
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H. J. Berubert

Erle K. Baker Inventor
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C. A. Snow & Co.

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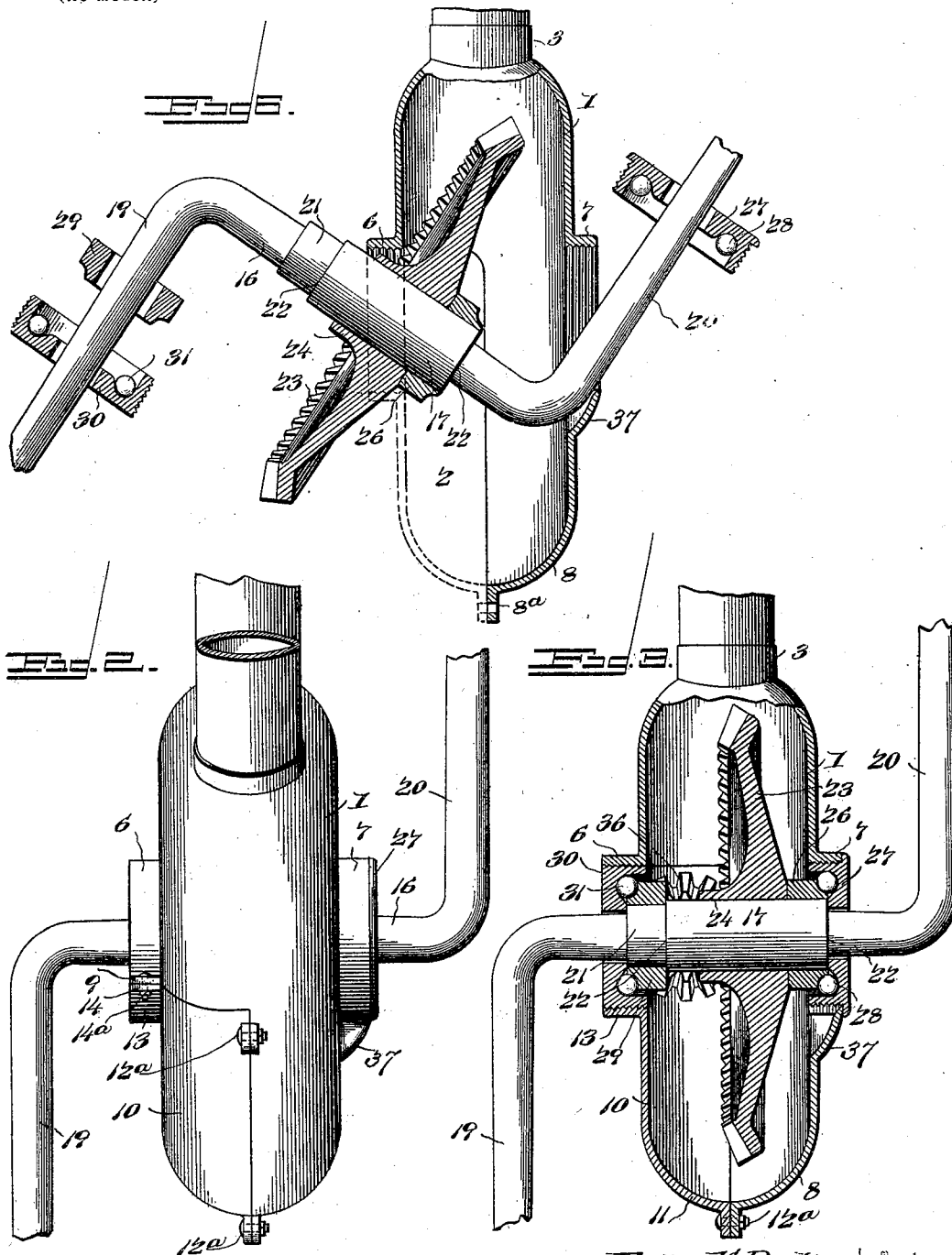
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2 Sheets—Sheet 2.



Witnesses

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UNITED STATES PATENT OFFICE.

ERLE K. BAKER, OF PARIS, TEXAS.

CHAINLESS BICYCLE.

SPECIFICATION forming part of Letters Patent No. 645,540, dated March 20, 1900.

Application filed August 23, 1898. Serial No. 689,324. (No model.)

To all whom it may concern:

Be it known that I, ERLE K. BAKER, a citizen of the United States, residing at Paris, in the county of Lamar and State of Texas, have
5 invented a new and useful Chainless Bicycle, of which the following is a specification.

My invention relates to improvements in bearings for chainless bicycles in which the pedal-shaft and a counter-shaft are driven by
10 beveled gearing; and one object that I have in view is to provide an improved construction of the crank-hanger and the bearing therein by which a one-piece driving-crank may, with its contained gear, be expeditiously
15 inserted or removed.

A further object of the invention is to provide an improved construction and arrangement of parts by which the driving-crank is supported firmly in place by ball-bearings,
20 with which are associated adjustable devices designed to compensate for the wear due to friction on the elements, and such construction also provides for the secure retention of the bearing cup and cone in the divided side
25 of the boxing which forms the crank-hanger.

With these ends in view the invention consists in the novel construction and arrangements of parts, which will be hereinafter fully described and claimed.

30 To enable others to understand the invention, I have illustrated the same in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a side elevation of a crank-hanger and a portion of a frame-tube constructed in accordance with my invention.
35 Fig. 2 is an edge elevation of the crank-hanger illustrated by Fig. 1. Fig. 3 is a vertical transverse section on the plane indicated by the dotted line 3 3 of Fig. 1. Fig. 4 is a side
40 elevation, partly in section, with the removable member of the boxing detached. Fig. 5 is a detail perspective view of the removable member of the crank-hanger. Fig. 6 is
45 an elevation illustrating the method of removing the driving-crank.

Like numerals of reference denote like and corresponding parts in each of the several figures of the drawings.

50 The crank-hanger 1 of my invention is in the form of a closed boxing having an opening 2 in one side thereof. The crank-hanger

proper is formed in a single piece of metal, and it is provided with the nipples 3 for union with the seat-post tube and the inclined reach
55 of an ordinary bicycle-frame. Said hanger is provided also with a rearwardly-extending coupling or nipple 4, adapted to be united in the ordinary way with the tube 5, which forms
60 a part of the rear bicycle-fork and serves to inclose or house the counter-shaft which transmits the motion of the crank or pedal shaft to the rear-wheel hub. On the divided side of the boxing, forming a part of the crank-hanger, is a segmental flange 6, and on the
65 opposite continuous side of said boxing an annular flange 7 is provided. These flanges are in axial alinement with each other at the center of the hanger or boxing, and one flange is provided with an interior right-hand screw-thread, while the other flange has an interior
70 left-hand screw-thread. The division of the open side of the boxing or hanger extends across or intersects with the segmental flange 6, and the face of the hanger or boxing provides a flange 8, which is perforated at intervals to produce the bolt-holes 8^a. At the
75 terminals of the segmental flange 6 are the lugs 9, which are pierced by openings that lie in planes at right angles to the bolt-holes 8^a and the flange 8.
80

10 designates the removable section of the boxing, which corresponds in area to the opening 2 in one side of the hanger, and this section is shaped to fit properly in the opening 2
85 and lie flush with the side and edge of the boxing or hanger. At its outer segmental edge the section 10 has a flange 11, provided with the bolt-holes 12, which coincide with the bolt-holes 8^a, when the section 10 is properly assembled in relation to the hanger, and
90 suitable bolts 12^a are passed through the holes 12 and 8^a to firmly join the section 10 to the boxing. This removable section is also provided with a segmental flange 13, the ends of
95 which terminate in the lugs 14, and this flange and its lugs are arranged to coincide with the flange 6 and its lugs 9 on the proper application of the section 10 to the boxing. The lugs
100 9 and 14 are joined firmly together by bolts or screws 14^a, and the flange 13 has a screw-thread which registers with the thread of the flange 6, so as to form a complete internal thread for reception of one of the bearing-

cups. The removable section 10 is also provided with a bulged portion 5, which lies coincident, or nearly so, with the nipple 4, so as to accommodate the bevel-pinion on the counter-shaft and enable said pinion to rotate freely within the boxing, while affording protection thereto against dust and dirt.

The line of separation between the sections 1 and 10 does not extend diametrically across the hanger in a straight line, but below the center thereof with the upper portion of the opening for the bushing greater than a half-circle, thereby causing the pedal-shaft to be supported by the solid material of the hanger independently of the support given to it by the section 10, which thus gives it greater strength. This construction, in combination with the making of the other side of the hanger integral throughout, gives a much firmer support for the pedal-shaft than if the line of separation extended through the center of the openings in the side of the casing.

The driving-crank 16 is a single piece of steel bent to form the shaft 17 and the cranks 19 20, said cranks extending in opposite directions from the shaft. The shaft near one of the cranks is turned down to form a shoulder 21 between the ribs 22, and on the shaft is fitted a driving-gear 23, having an elongated hub 24, which is keyed or otherwise rigidly fastened to the shaft at one side of the shoulder 21 thereon. On the right-hand end of the shaft is fitted a cone 26, which is adapted to abut against the driving-gear 23, and is housed partly within the bearing cup 27. This bearing-cup is exteriorly threaded to be screwed firmly into the internally-threaded flange or bushing 7 of the boxing, and the cone rides upon the bearing-balls 28, which are confined within a raceway of the bearing-cup 27.

On the shouldered portion 21 of the crank-shaft which lies to the left of the gear 23 is slipped a cone 29, adapted to impinge against one of the ribs 22 of said shaft, and this cone 29 rides freely in a cup 30, which is externally threaded for the purpose of being screwed into the annular bushing formed by the segmental flanges 6 and 13 at the divided side of the boxing. This bearing-cup 30 contains a series of balls 31, upon which rides the cone 29 on the left-hand end of the crank-shaft. This bearing-cup 30 is designed to be held firmly in place within the divided bushing formed by the coincident flanges 6 13 by tightening the bolts 14^a, which unite the lugs of said flanges 6 and 13, and the section 10 is thus adapted to be united firmly to the open side of the boxing, while the bolts 14^a contribute to the security of the fastening of said section 10 and serve to hold the cup 30 firmly in place.

The counter-shaft 33 extends through the tube 5, forming a part of the rear fork, and at its forward end this counter-shaft is reduced and shaped to produce a polygonal or square shank 34, which is preferably tapered

somewhat for the reception of the hub of the bevel-pinion 36. The extremity of the counter-shaft terminates in a threaded tenon 35, and the hub 37 of the bevel-pinion is interiorly formed to fit snugly on the tapered and angular shank 34 of the shaft 33. The bevel-pinion is securely seated on the counter-shaft to rotate at all times therewith, and displacement of said pinion is overcome by a nut 38, which is screwed on the threaded tenon 35 of the shaft. The end of the shaft carrying the bevel-pinion is equipped with a cone 39, which is slipped on said shaft to abut against the hub of the pinion, and this cone rides on a series of balls 40, which are loosely confined in a bearing-cup 41, which is supported in the nipple 4 or the tube 5.

The driving-crank 16 has its shaft 17 supported by ball-bearings in the crank-hanger, and the counter-shaft 33 is also supported in a ball-bearing of the crank-hanger, thus insuring great freedom of motion to the crank and counter-shaft and minimizing the friction and wear on the working elements of the gearing. The driving-gear 23 and the bevel-pinion 36 are both housed within a tight-boxing which excludes the entrance of dust and dirt, thus affording maximum protection to the working parts against clogging by dust, which is liable to interfere with the proper operation of the gear. To remove the driving-crank and its contained gear 23 from the crank-hanger, the bearing-cup 27 should be unscrewed from the annular bushing 7, and after the bolts 14^a have been removed the bearing-cup 30 should be unscrewed from the dividing-bushing formed by the flanges 6 13. The bolts which unite the flanges 6 13 of the hanger and its removable section 10 are now removed to permit the section 10 to be detached from the hanger, thus exposing the opening 2 in one side of the hanger. The bushing formed by the flanges 6 13 is open at its lower side, so as to permit the cone 29 and cup 30 to be readily slipped around the bend between the shaft 17 and one of its cranks, and the cup 37 has an opening therein of a diameter greater than that of the shaft or its crank, so that it may also be slipped around the other crank. The removal of the bearing-cup from the bushings and the detachment of the section 10 from the hanger enable the driving-crank to be canted or tilted to the position indicated by Fig. 6, in which one crank of the shaft 17 may be slipped or drawn through the annular bushing 7, while the other part of the shaft is raised into the divided bushing, thus permitting the bevel-gear 23 to pass through the opening 2 in the divided side of the boxing or hanger. The driving-crank, with the bevel-gear 23 thereon, may thus be removed from the hanger without detaching the gear from the shank, and said crank, with its gear, may be replaced in the crank-hanger by a reverse adjustment of the parts. This requires the tilting of the driving-crank to a position where one crank

thereof may pass through the annular bushing 7, and the gear 23 enters the opening 2 in the side of the boxing, and as the parts enter the hanger the crank is twisted or manipulated to cause one crank to pass entirely through the bushing 7 and the other end of the shaft 17 to properly enter the flange 6 of the divided bushing. The cones 26 and 29 are now properly slipped on the shaft, the section 10 is replaced and bolted in position on the hanger, and the cups 27 30 are screwed into the bushings 6 7, after which the bolts 14^a are tightened to firmly clamp the cup 30 within the divided bushing.

15 The cup 27, which screws into the annular bushing 7, may be held firmly in place by a screw or other detent in a manner well understood by those skilled in the art. The counter-shaft 33 extends from the crank-hanger rearwardly to the hub of the rear wheel, and I prefer to place the gearing between the wheel-hub and the rear end of this shaft 33 in rear of the wheel-hub itself.

By locating the line of division between 25 the sections of one side of the hanger or casing below the center it is evident that if the line were made straight from one portion of the circumference of the hanger to the other the casing would have to be much larger than 30 desired to permit of the teeth or outer edge of the gear-wheel being removed from the casing without coming in contact with the section of the hanger. To avoid this, I prefer to form the line of separation substantially V-shaped—that is, to make the portions of the line upon opposite sides of the center diverge upwardly from a point below the center of the opening of the bushing to the rim of the casing. This permits of the 40 central portion of the side of the hanger extending below the center thereof to secure the necessary strength and places the ends of the line of separation so high above the center that the gear-wheel may be removed 45 without its coming in contact therewith. To further assist in removing the gear-wheel, it is preferably dished out upon the side next the removable section, so that as the shaft is being removed from or placed within the 50 hanger the downwardly-projecting portion of the hanger adjacent to the center will project into the dished portion of the gear-wheel, thereby permitting the axle being drawn upward in that direction as far as possible to let the crooked portion of the axle upon the 55 opposite side of the gear-wheel pass through the opening in the opposite side of the hanger, the hanger being provided with a slight depression or recess 37 for the reception of said crooked portion, and thus assist in the manipulation of the shaft.

It is to be understood that in removing the crank-shaft and its gear from the hanger and boxing the gear-pinion 36 should be first detached from the counter-shaft, and then the 65 crank-shaft may be easily removed.

I prefer to have one end of the line of di-

vision or separation adjacent to or slightly above the nipple 4, so that when the section 10 is removed the pinion 36 and its bearing 70 can be easily removed. As the greatest strain will come upon the side opposite the pinion 36, owing to the crowding action between the gear-wheel and the pinion, I prefer to form the side of the hanger opposite the pinion integral throughout in order to secure the greatest strength possible. 75

I have not deemed it necessary in this application to illustrate the means by which the rear end of the counter-shaft is journaled in 80 the frame to have the gears thereon mesh with the gear on the rear wheel, as any suitable means may be adopted for the support of the rear end of said counter-shaft.

Changes may be made in the form of some 85 of the parts, while their essential features are retained and the spirit of the invention embodied. Hence I do not desire to be limited to the precise form of all the parts as shown, reserving the right to vary therefrom. 90

Having thus described the invention, what I claim is—

1. In a chainless bicycle, a casing, the main body of which is integral throughout and the lower portion of one side is removable, both 95 sides being provided with registering openings, and the line of separation between the removable and the integral portions diverging upward from below the center of the opening upon that side, the casing upon the other 100 side being provided with a recess below the opening, combined with removable bearing-cups in the openings, and a one-piece crank through said cups, the central portion of which crank is provided with a gear-wheel 105 rigidly secured thereto, substantially as described.

2. In a chainless bicycle, a crank-hanger having its main body and the sides thereof made in a single piece and provided with an 110 annular threaded bushing on one side and on its opposite side with an opening, 2, said main body also provided on one side with a segmental flange which is internally threaded and terminates at its ends in lugs, and a removable section fitted to the opening, 2, of 115 the hanger and formed with a threaded segmental flange having lugs and arranged to lie coincident with said segmental flange to complete an annular bushing on the divided 120 side of the hanger, in combination with bearing-cups screwed into the annular and divided bushings, bolts or screws which unite the section to the hanger and the segmental flanges which form the divided bushing, a 125 single-piece driving-crank, a gear fast with said crank at the middle thereof and housed within said hanger, and bearing-cones fitted to said driving-crank and contained within the bearing-cups, substantially as described. 130

3. In a chainless bicycle, a crank-hanger comprising the main body having the two sides integral therewith and provided with registering openings in said sides, one of the

sides of said hanger having its lower part divided on lines which diverge upwardly from below the center of the hanger, a removable section conforming to the division of said side
5 of the hanger, and means for clamping the removable section firmly and detachably to the divided side of the hanger, combined with bearing-cups fitted in the openings of the integral and divided sides of the hanger,
10 one of said bearing-cups being clamped in place by the removable section, a one-piece

crank supported in said bearing-cups, and a gear fast with said crank and removable therewith through the open side of the hanger, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ERLE K. BAKER.

Witnesses:

P. A. SPEARS,
W. N. SUMNER.