No. 616,262. Patented Dec. 20, 1898.

O. W. SCHAUM.

CHAINLESS BICYCLE.

(Application filed Dec. 31, 1897.)

(No Model.) 2 Sheets—Sheet 1.

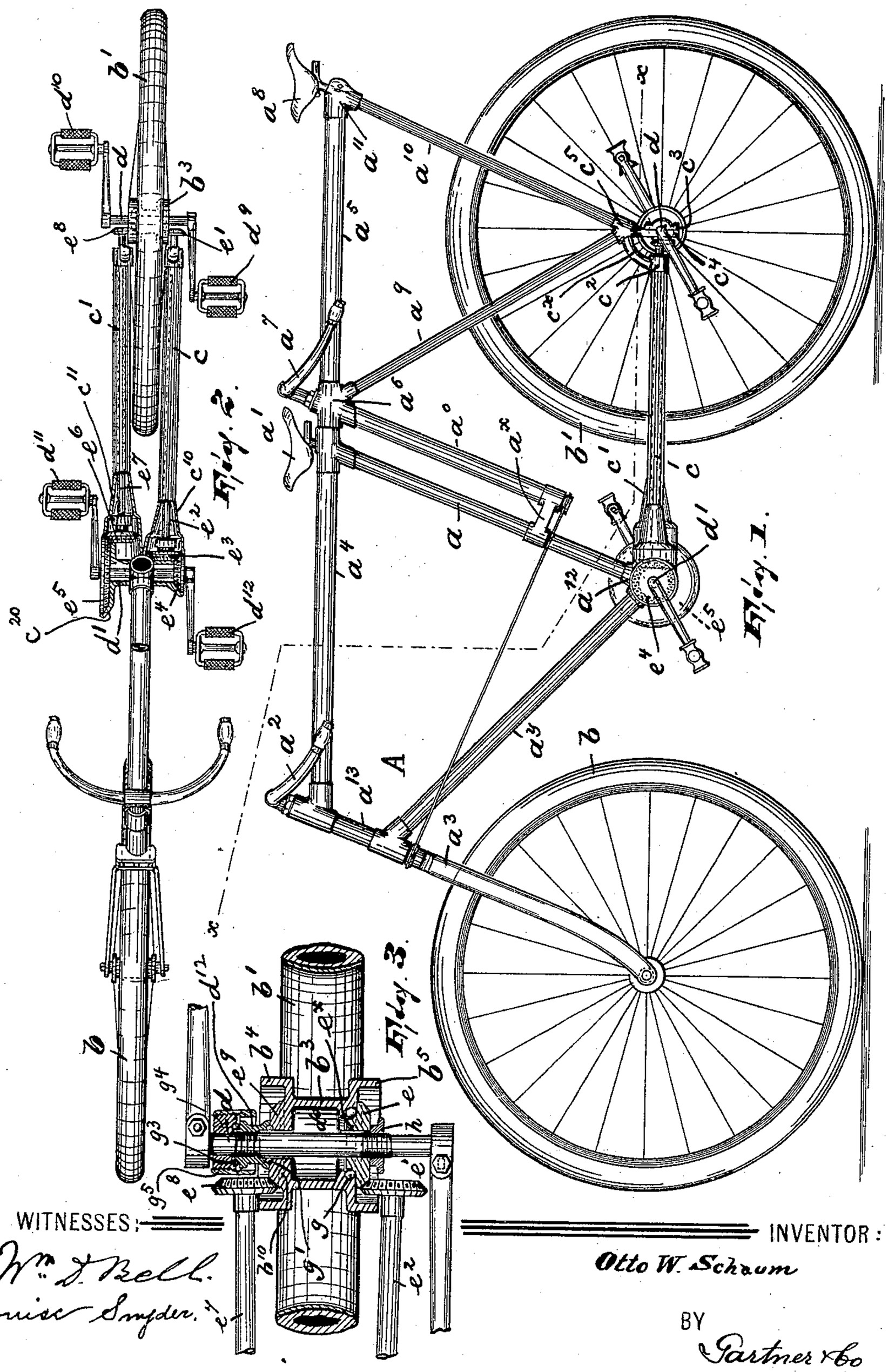

Fig. 1.

Fig. 2.

Fig. 3.

WITNESSES;

Wm. D. Bell.

Louise Snyder.

INVENTOR:

Otto W. Schaum

BY

Partner & Co

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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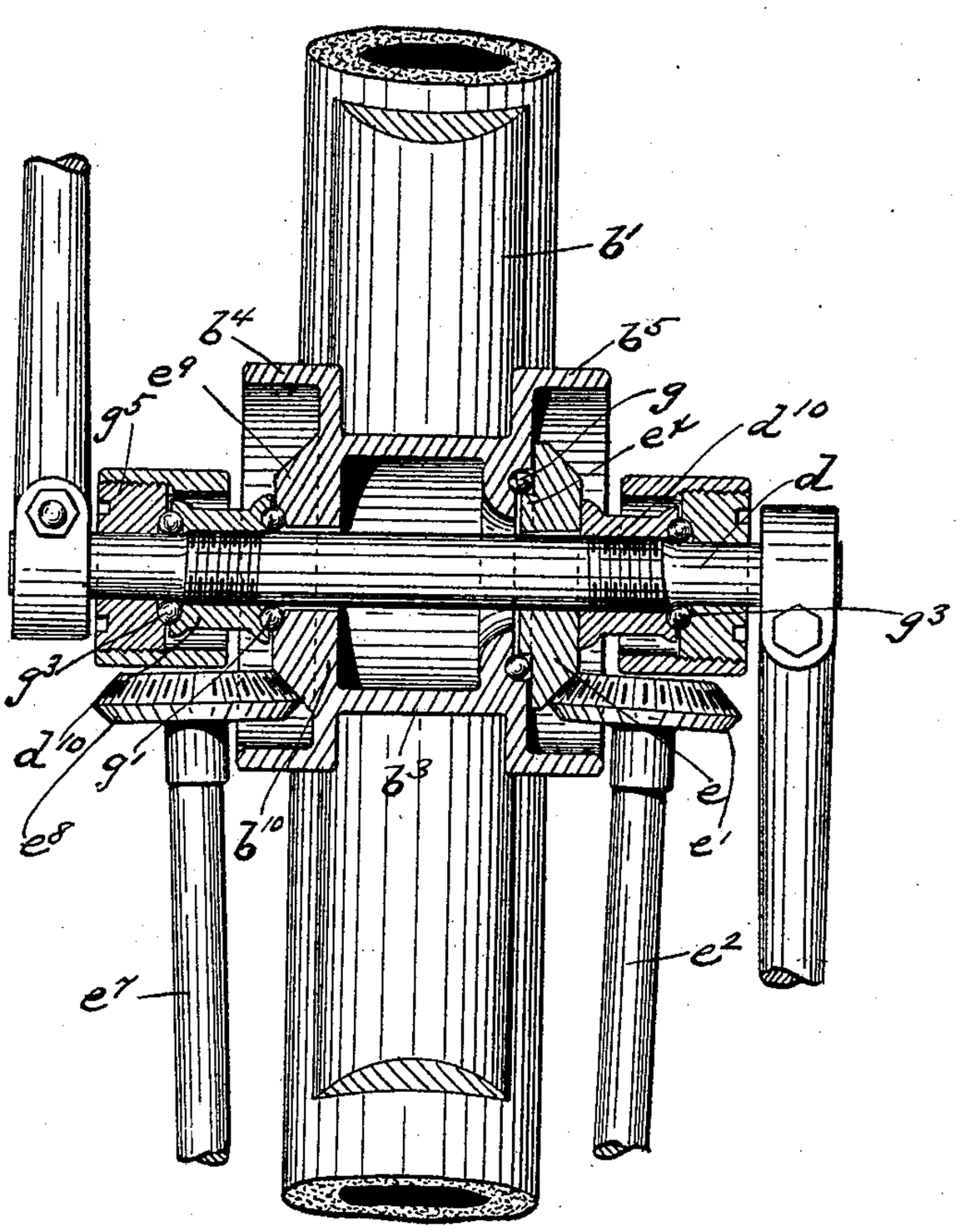

Fig. 4.

WITNESSES:

Wm. D. Bell.

Robert J. Pollitt

INVENTOR

Otto W. Schaum,

BY

Gartner & Co.

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

OTTO W. SCHAUM, OF PHILADELPHIA, PENNSYLVANIA.

CHAINLESS BICYCLE.

SPECIFICATION forming part of Letters Patent No. 616,262, dated December 20, 1898.

Application filed December 31, 1897. Serial No. 665,131. (No model.)

To all whom it may concern:

Be it known that I, OTTO W. SCHAUM, a citizen of the United States, residing in Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Chainless Bicycles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My present invention relates to improvements in bicycles, and particularly to that class commonly known as "tandem" bicycles; and its object is to improve the prior constructions of such tandems, to provide simple and effective means for transmitting the motion from the crank-shafts to the driving-wheel, to provide a novel, simple, and durable ball-bearing for the hub of the driving-wheel, and, in general, to provide a tandem which is light yet strong and durable in construction, not liable to get out of order, and easily propelled.

The invention consists in the improved tandem, in the ball-bearing for its driving-wheel, in the means for transmitting the motion from the crank-shafts to said driving-wheel, and in the combination and arrangement of the various parts, substantially as will be hereinafter more fully described, and finally pointed out in the appended claims.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in each of the several views, Figure 1 is a side elevation of my improved tandem; Fig. 2, a sectional view on the lines $x\,x$ of Fig. 1, certain portions being removed and others broken away to better illustrate the nature of my said invention; Fig. 3, an enlarged detail view, partly in section, of the ball-bearings for the hub of the driving-wheel and for its respective crank-shaft; and Fig. 4 is an enlarged detail view of a certain modified form of said ball-bearings for the hub of the driving-wheel and its respective shaft.

In said drawings, A represents the bicycle-frame, which resembles somewhat the well-known "diamond" frame, which latter has been suitably changed, and comprises the front fork a^3, the top bar a^4, the rear stays or fork a^9, the lower braces $c\,c'$, the diagonal a, and the connecting-brace a^y. The front fork penetrates the head a^{13} and is connected with the handle-bars a^2 in the usual manner and furnishes the bearings for the front wheel b.

The saddle a' is placed in alinement with the diagonal a, while the lower portion of said diagonal and the lower portion of the connecting-brace a^y are suitably jointed to the crank-hanger a^{12}, which latter furnishes the bearings for the crank-shaft d' carrying the pedal-cranks d^{11} and d^{12}.

The rear stays or fork a^9 is connected by a socket-joint a^6 with the top bar a^4, while their lower portions are secured in socket-joints c^5, to which latter are also connected the auxiliary stays a^{10}, the upper ends of which are secured in the socket-joint a^{11}. An auxiliary top bar a^5 connects said socket-joint a^{11} with the socket-joint a^6 and is in alinement with the top bar a^4.

The rear saddle a^8 is arranged on and carried by the socket-joint a^{11} and the auxiliary stays or fork a^{10}, respectively, while the rear handle-bars a^7 are arranged on a rod revolubly mounted in the tube a^0, which latter is secured with its upper portion in the socket-joint a^6, while its lower portion is connected with the diagonal a by means of a bridge or cross-arm a^x.

The forward portions of the lower braces c c' are provided with substantially conical-shaped enlargements c^{10} and c^{11}, respectively, communicating with and connected to a casing c^{20}, which in turn is secured to and projects from each side of the crank-hanger a^{12}. The rear end of each of said lower braces c and c' is connected to a sleeve c^2, which in turn is secured to its respective socket-joint c^5 by a curved tube or rod c^x or in any desired manner, while a substantially vertical arm c^4 projects downward from the socket-joint c^5, to which it is secured, or said arm c^4 may be made integral with its respective auxiliary stay a^{10}, if so desired.

The arms c^4 on each side of the driving-wheel b' form, together with the heads or caps

c^3, a support for the bearings for the rear crank-shaft d, which carries the pedal-cranks d^9 and d^{10}.

The driving-wheel b' is provided with a hollow hub b^3, having on each end an annular sleeve b^4 b^5, and is revolubly mounted upon the crank-shaft d in the following manner: The hollow hub b^3 is provided on one side with an inwardly-extending flange b^{10} and integral beveled gear-wheel e^9, having an annular groove, in which are arranged a series of antifriction-balls g', bearing upon the crank-shaft d and operating in an internal ball-race in the inner end of a sleeve d^{12}, which latter is adjustably secured on the screw-threaded portion of the crank-shaft d. The outer end of said sleeve d^{10} is also provided with an annular groove, in which is arranged a series of antifriction-balls g^3, bearing against a collar g^4, revolubly mounted on the crank-shaft d and screw-threaded at its outer periphery and adapted to be engaged by an internally-threaded split ring g^5, which latter is removably arranged between the arm c^4 and its head or cap c^3. (See Figs. 1, 3, and 4.) The opposite side of said hollow hub b^3 is provided with an inner annular groove, forming an annular chamber with the annular groove of a collar or hub e^x, which latter is keyed to the crank-shaft d, as clearly illustrated in Fig. 3 of the drawings. In said annular chamber is also arranged a series of antifriction-balls g.

Integral with the collar or hub e^x is a beveled gear-wheel e, the outer portion of which is engaged by a nut h adjustably secured on the screw-threaded portion of the crank-shaft d.

If desired, the nut h can be dispensed with, in which case a ball-bearing arrangement is used, substantially similar in construction to the ball-bearing arrangement heretofore described in connection with the opposite end of the shaft and which is indicated in Fig. 4.

The beveled gear e, which by means of its integral collar or hub e^x is securely mounted on the crank-shaft d, meshes into a beveled gear e', secured on the rear end of a rod or shaft e^2, penetrating the tube c and having suitable bearings therein and carrying at its forward end a beveled gear e^3, which in turn meshes with the beveled gear e^4, secured on the crank-shaft d' and on one side of the crank-hanger a^{12}. On the other side of said crank-hanger, and also secured on the crank-shaft d', is a beveled gear-wheel e^5, larger in diameter than the beveled gear e^3 and meshing with the beveled gear e^6, secured on the forward end of a rod or shaft e^7, which latter penetrates the brace c' and is suitably supported therein. On the rear end of the last-mentioned rod or shaft e^7 is securely mounted a beveled gear e^8, meshing with the beveled gear e^9, which latter is integral with and forms a part of the hollow hub b^3 of the rear wheel b'.

When the rear pedals are operated, the crank-shaft d transmits its motion through the beveled gear e to the beveled gear e', which latter in turn rotates through the beveled gears e^3 and e^4 the crank-shaft d'. The bevel-gear e^5, which is also mounted on said crank-shaft d', transmits the motion of the latter through the beveled gear e^6, shaft e^7, and beveled gear e^8 to the beveled gear e^9, and as the latter, as heretofore described, is integral with the hub b^3 operates the driving-wheel b'. The latter will be rotated at a higher speed than the speed of the crank-shaft d, as the speed of the same is multiplied by the large beveled gear e^5 engaging the smaller gear e^6, and it will be manifest that said speed can be easily changed by changing the diameter of the multiplying-gear e^5.

It must also be remarked that by operating the front pedals d^{11} and d^{12} the work of operating the rear wheel b' is divided between the two riders, and, furthermore, the strain exerted upon the various beveled gears is equalized and balanced.

I do not intend to limit myself to the precise construction shown and described, as various alterations can be made without changing the scope of my invention; but

What I claim as new, and desire to secure by Letters Patent, is—

1. A tandem-bicycle frame comprising a forward diamond frame, a rear frame having the form of an inverted isosceles triangle one of whose sides consists of the rear forks or stays of said diamond frame and another of whose sides constitutes a longitudinal projection of the horizontal bar of said diamond frame and carries at its forward and rear ends, respectively, the rear handle-bars and saddle, and arms projecting vertically downward from the lower apex of said triangular frame and adapted to receive the rear axle vertically beneath said apex, substantially as described.

2. A tandem bicycle comprising a forward diamond frame, a rear frame having the form of an inverted isosceles triangle, one of whose sides consists of the rear forks or stays and another of whose sides constitutes a longitudinal projection of the horizontal bar of said diamond frame and carries at its forward and rear ends, respectively, the rear handle-bars and saddle, arms projecting vertically downward from the lower apex of said triangular frame and adapted to receive the rear axle vertically beneath said apex, gear-casings constituting the lower side of said diamond frame and projecting toward said axle, and curved connecting-rods between the rear ends of the gear-casings and said apex of said triangular frame, substantially as described.

3. In a bicycle, the combination with the frame, of the rear axle carrying pedal-cranks, a hollow hub for the rear wheel penetrated by said axle, bevel-gears, the one revoluble with the axle and the other integral with the hub, said bevel-gears being at opposite ends of the hub, operatively-connected bevel-gears in mesh with said first-mentioned gears, a collar integral with the axle-gear, keyed there-

with onto said axle and projecting into the hub, sleeves, the one having internal ball-races at both ends and screwed onto the axle adjacent the hub-gear and the other having an internal ball-race at its outer end and screwed onto the axle adjacent the axle-gear, and ball-bearings situated between said collar and the hub, between the axle and a portion of the frame and in the ball-race in the outer end of each sleeve, and between the axle and the hub-gear and in the inner ball-race of the sleeve adjoining said hub-gear, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 27th day of December, 1897.

OTTO W. SCHAUM.

Witnesses:
BELLE G. ELLIOTT,
L. M. LENTZ.