

No. 636,260.

Patented Nov. 7, 1899.

J. HANA.  
CHAINLESS BICYCLE.

(Application filed Nov. 19, 1898.)

(No Model.)

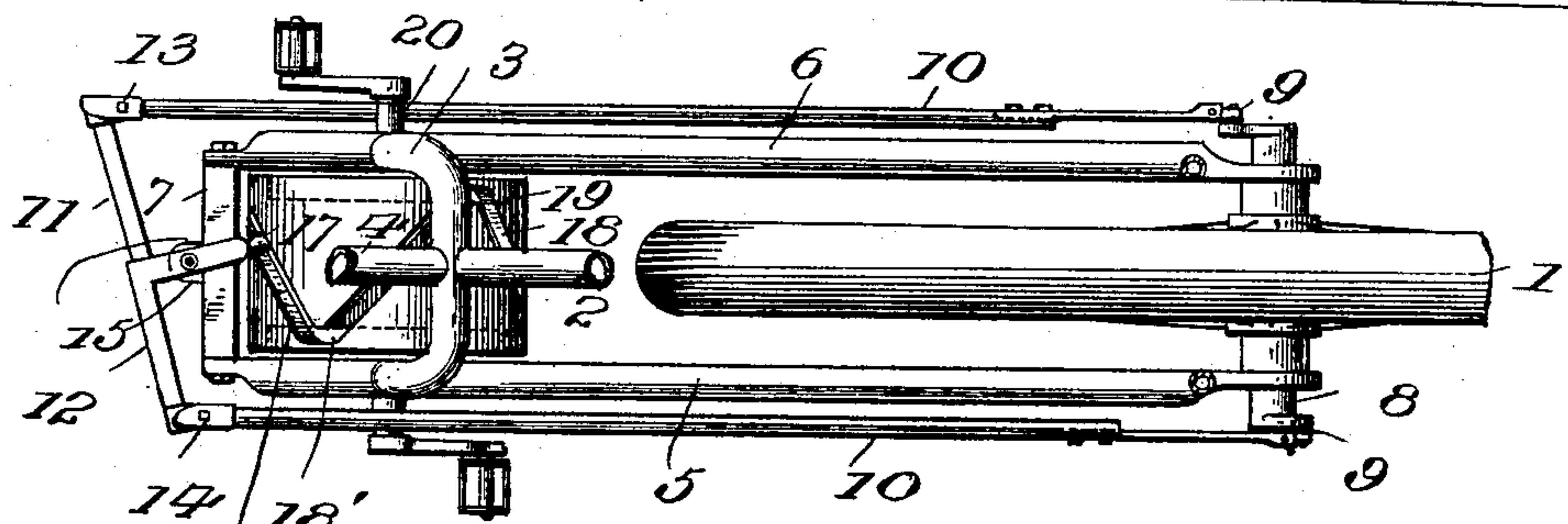
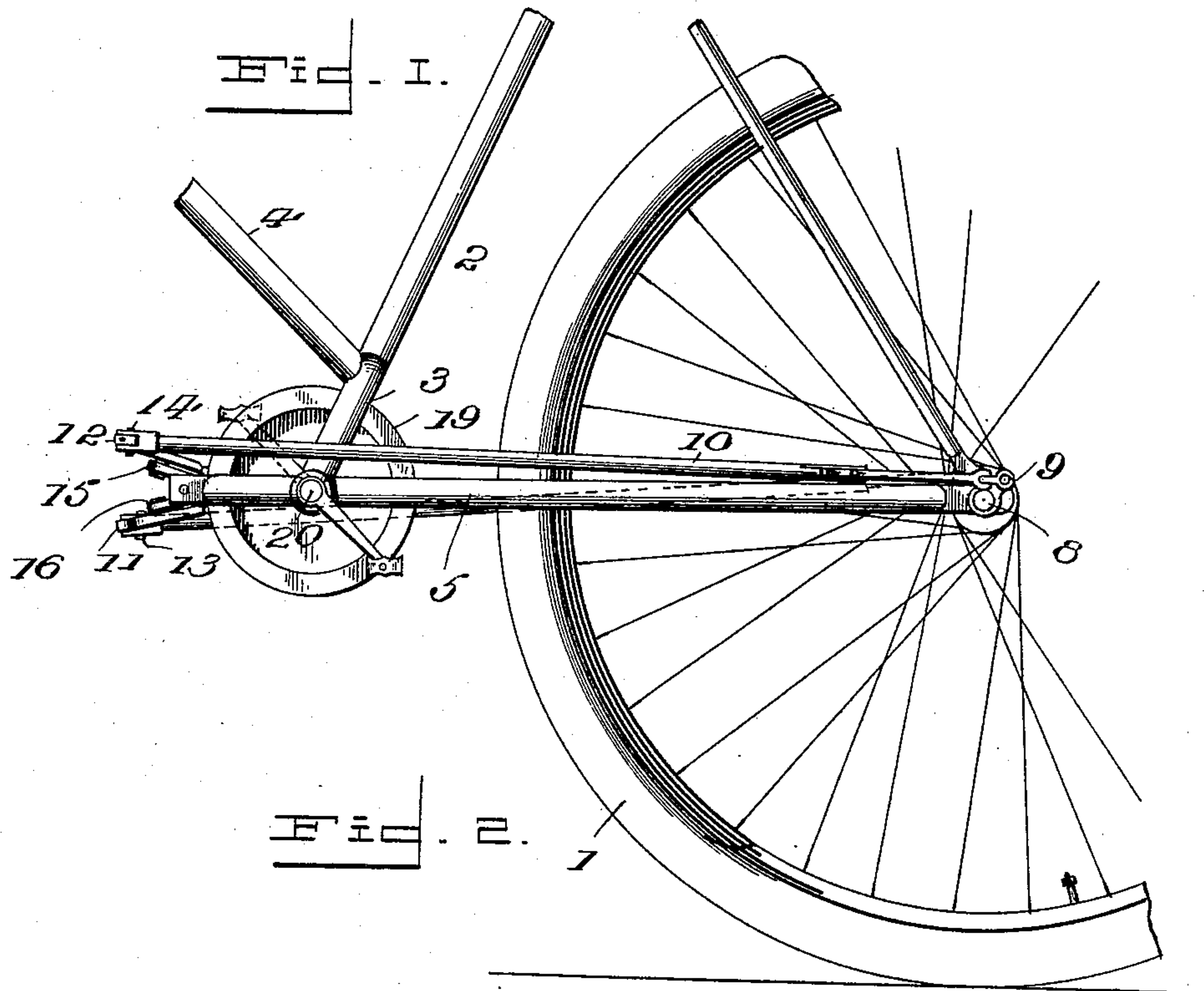
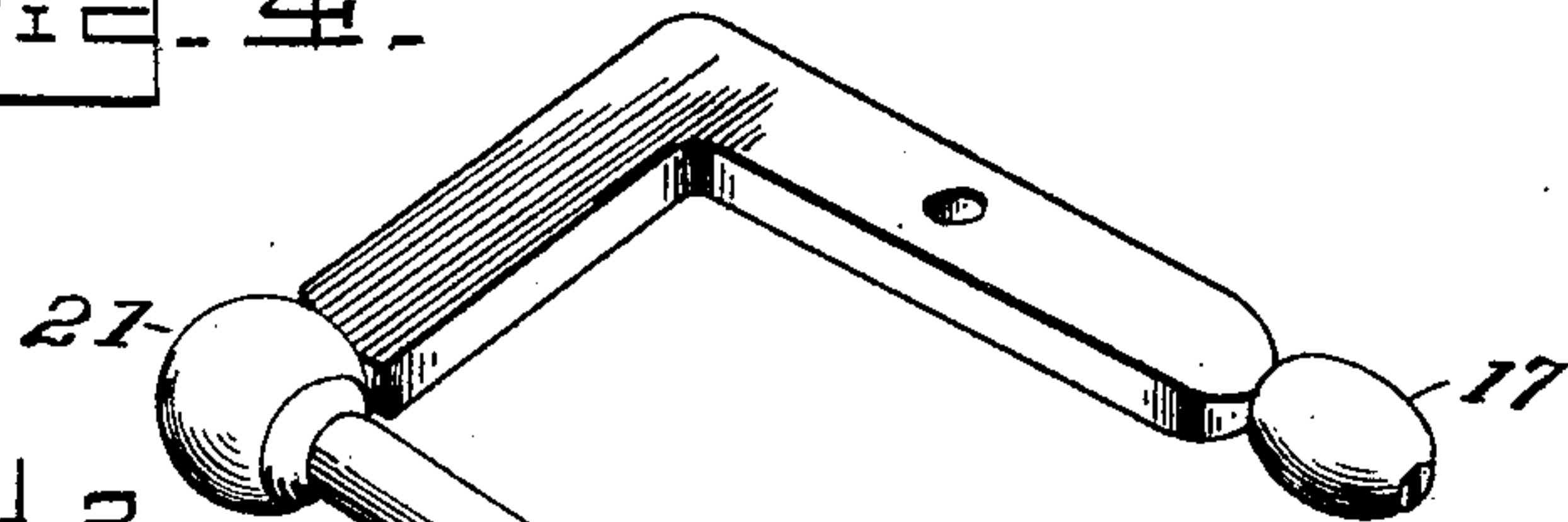
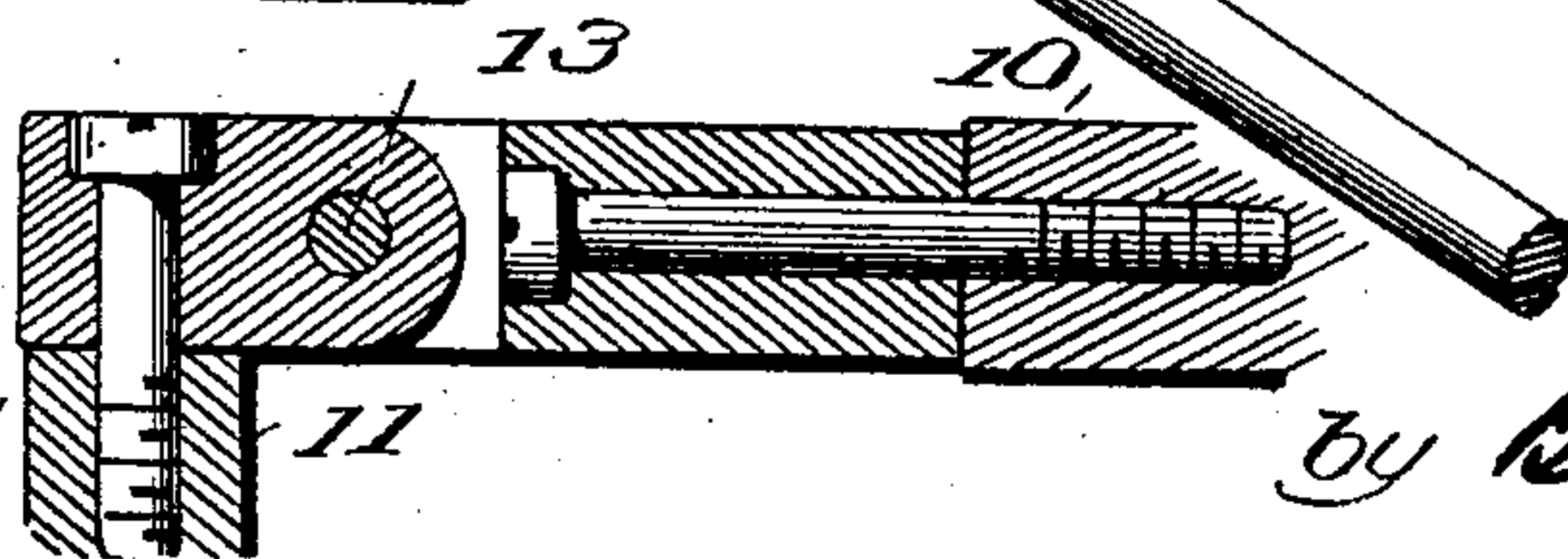


Fig. 3.



Witnesses  
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# UNITED STATES PATENT OFFICE.

JOSEPH HANA, OF CHICAGO, ILLINOIS.

## CHAINLESS BICYCLE.

SPECIFICATION forming part of Letters Patent No. 636,260, dated November 7, 1899.

Application filed November 19, 1898. Serial No. 696,894. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH HANA, a resident of Chicago, in the county of Cook and State of Illinois, 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 pertains to make and use the same.

The invention relates to chainless bicycles, and has for its object to increase the efficiency and economy of such machines.

The invention consists in the construction herein described and pointed out.

In the accompanying drawings, Figure 1 is a partial side elevation of the improved machine. Fig. 2 is a plan of the same. Fig. 3 is a sectional view showing the connection between the crank-rod and driving-lever. Fig. 4 is a perspective of a modified detail.

Numeral 1 denotes the rear wheel of a bicycle having an axis provided with cranks disposed to avoid a dead-center.

2 indicates a tube supported on an arch 3 of the frame to receive a seat-post, and 4 is a tube or rod connecting the arch and handle-bar post, these tubes forming part of a diamond frame, though the particular style of frame is not essential. The frame cross-bar or arch 3 has each end fixed to parallel frame members 5 and 6, which are also connected by a cross-bar 7.

8 denotes the rear-wheel axle, rotatably supported in the parallel frame-bars and provided with cranks 9.

10 are crank-rods connected with bent driving arms or levers 11 and 12 by pivots 13 and 14, respectively. The lever 11 has its fulcrum in a lug or extension 15 of the bar 7, and the arm 12 is similarly connected to a lug 16, fixed to said bar. The end of each of the bent levers opposite that to which a connecting-rod is pivoted is provided with a roller 17, adapted to run in a cam-groove 18, formed in the periphery of a wheel 19, which is fixed to the crank-shaft 20 of the bicycle. This shaft is rotatably supported in the parallel frame-bars 5 and 6 and is provided with pedals, as usual.

Instead of connecting rods 10 and the bent levers 11 and 12 by pivots 13 and 14, as shown

in Figs. 1, 2, and 3, a ball-and-socket joint 21, such as illustrated in Fig. 4, may be employed.

In operation the rotation of the pedal crank-shaft and of the cam-wheel 19, fixed thereto, causes the bent levers to reciprocate each about its fulcrum, but in opposite directions, with the effect to reciprocate the connecting-rods 10 alternately in opposite directions and drive the bicycle-wheel 1 by means of the wheel-axle cranks 9. The opposite movements of the levers 11 and 12 are produced by the two levers having rollers 17, which travel in adjacent parts 18' and 18'' of the cam-groove, but in transverse directions, the rollers following each other in the continuous zigzag track.

It will be seen that I use but a single cam-groove to operate the two levers, the necessary motion being gained by causing the ends of the levers to rest normally within different phases of the cam-groove—that is to say, the end of one lever rests in that portion of the cam-groove adapted to move the lever in one direction, while the second lever rests within that part of the groove adapted to move it in a direction opposite the movement of the first lever, whereby the desired motion is obtained.

Having thus described my invention, what I claim is—

1. In a driving mechanism, a power-driven cam-wheel formed with a single cam-groove, independent levers pivoted one above the other and having their operative ends entering different phases of the cam-groove, and suitable connections between the levers and the mechanism to be driven.

2. In a bicycle, the main wheel provided with a crank-axle, the connecting-rods, a plurality of independent approximately right-angled levers having pivotal connection with the frame, and a cam-wheel having a single cam-groove fixed to the pedal-shaft, said levers having parts entering different phases of the cam-groove to reciprocate the rods.

3. A bicycle having its main wheel provided with a crank-axle, connecting-rods leading from said axle, a cam-wheel fixed on the pedal-shaft and provided with a single cam-groove, a plurality of independent approximately right-angled levers pivotally connected with the bicycle-frame in vertical alinement, one end of each of said levers being provided with

a ball, the ends of the levers entering different phases of the cam-groove.

4. A bicycle having its main wheel provided with a crank-axle, connecting-rods leading  
5 from said axle, a cam-wheel fixed on the pedal-shaft and provided with a single cam-groove, a plurality of independent approximately right-angled levers pivotally connected with the bicycle-frame in vertical alinement, one  
10 end of each of said levers being provided with a ball, the ball ends of the levers entering

different phases of the cam-groove, the other end of the levers being each connected to the connecting-rod by a universal-joint connection.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOSEPH HANA.

Witnesses:

OTTO L. KOLAR,

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