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Patented Apr. 11, 1899.

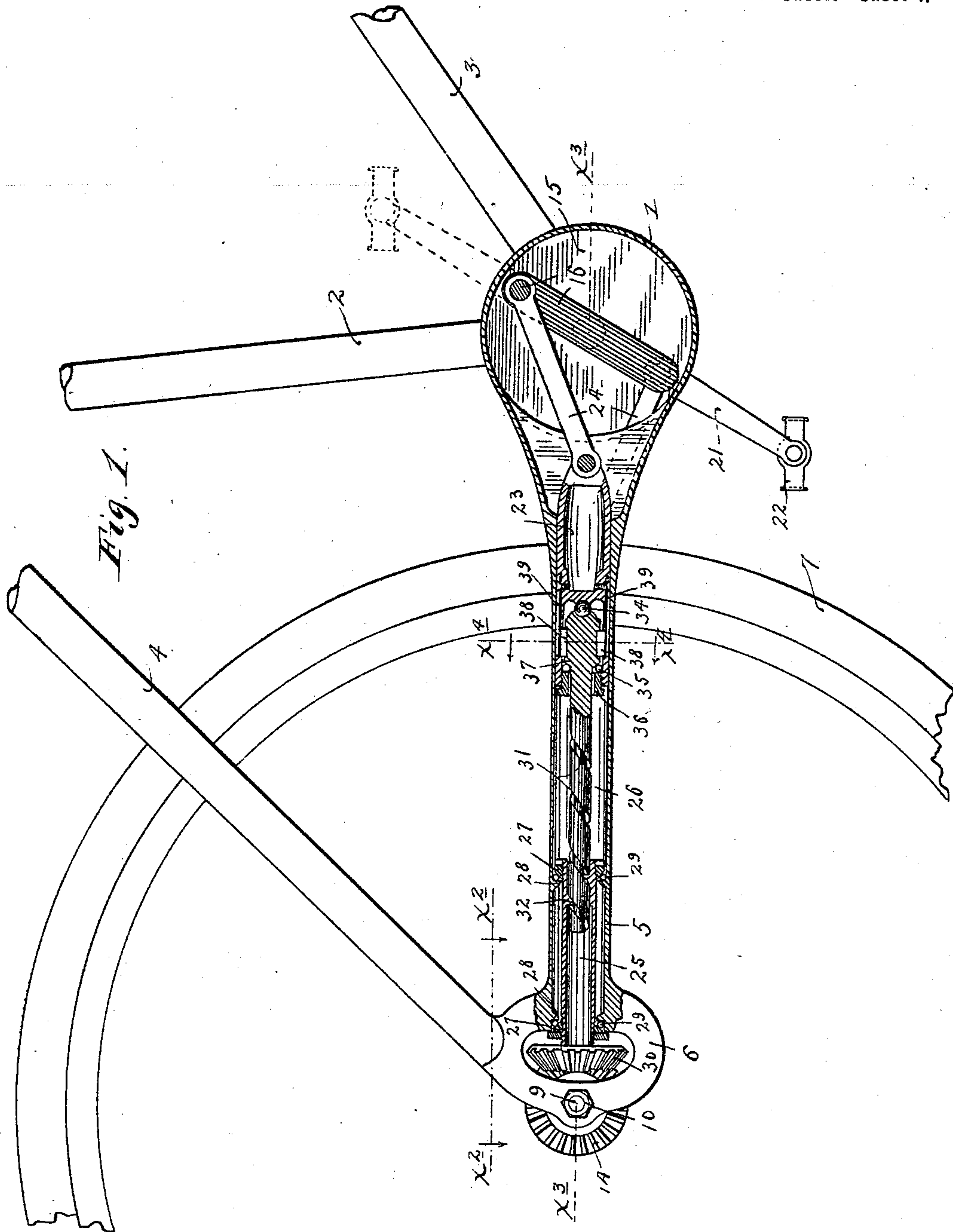
O. N. OLSON, C. H. SMITH & W. C. BELINA.

CHAINLESS BICYCLE.

(No Model.)

(Application filed Jan. 11, 1898.)

2 Sheets—Sheet 1.



Witnesses.

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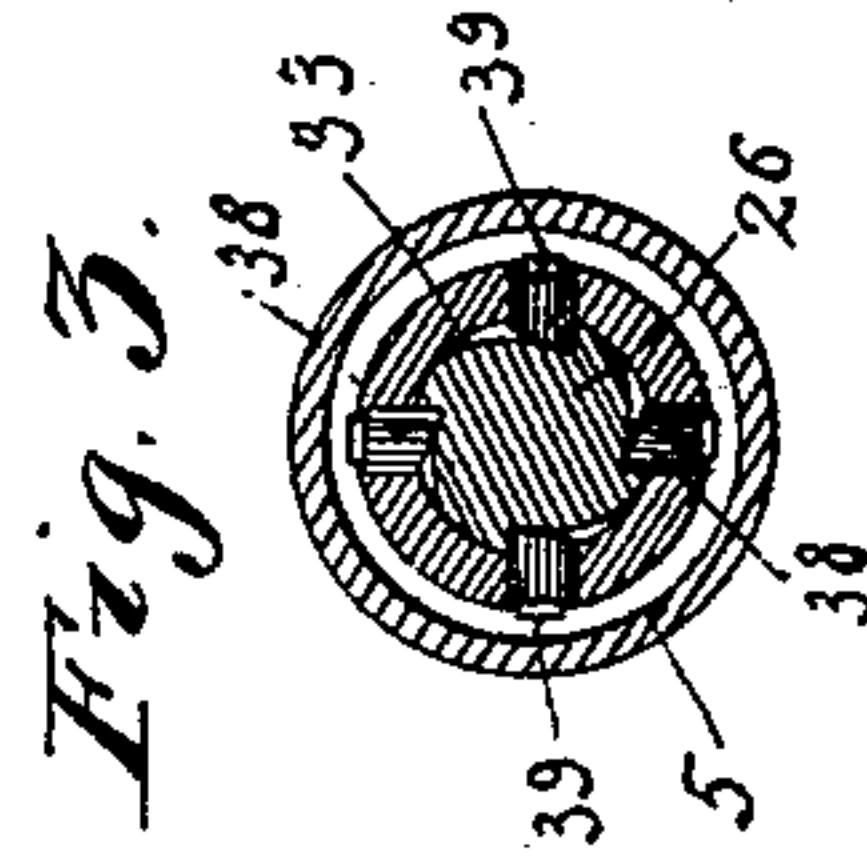
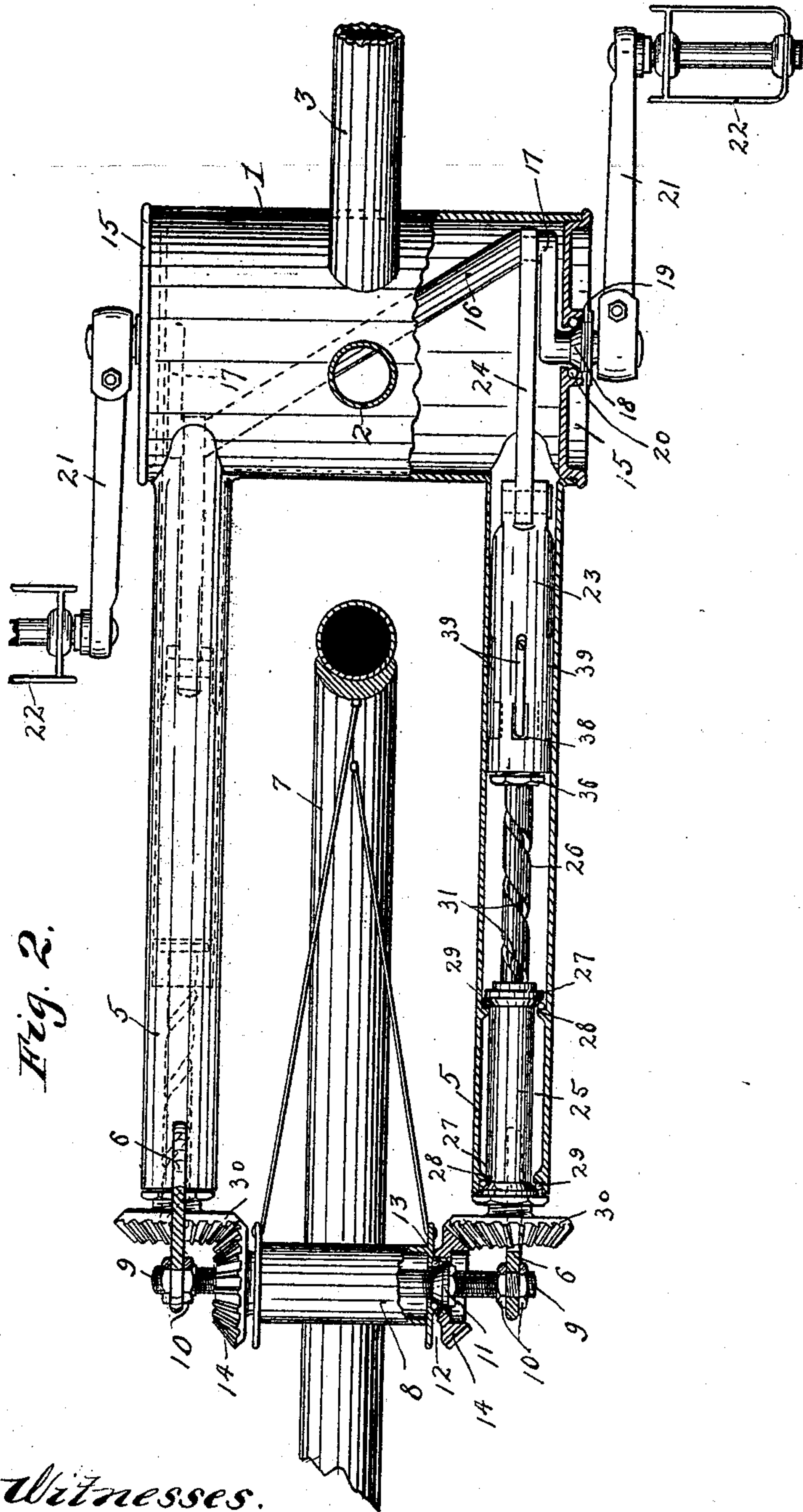
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UNITED STATES PATENT OFFICE.

OLIVER N. OLSON, CHARLES H. SMITH, AND WENCEL C. BELINA, OF
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CHAINLESS BICYCLE.

SPECIFICATION forming part of Letters Patent No. 622,780, dated April 11, 1899.

Application filed January 11, 1898. Serial No. 666,304. (No model.)

To all whom it may concern:

Be it known that we, OLIVER N. OLSON, CHARLES H. SMITH, and WENCEL C. BELINA, citizens of the United States, residing at Owatonna, in the county of Steele and State of Minnesota, have invented certain new and useful Improvements in Chainless Bicycles; and we 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.

From a broad point of view our invention relates to an improved propelling mechanism for cycles; but it has for its primary object to provide an improved bicycle of the so-called "chainless" type.

To the ends above noted, our invention consists of the novel devices and combinations of devices hereinafter described, and defined in the claims.

The preferred form of our invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Figure 1 is a view, partly in side elevation and partly in longitudinal vertical section, showing a portion of a bicycle to which our improved driving mechanism is applied. Fig. 2 is a horizontal section taken partly on the line $x^2 x^2$ of Fig. 2 and partly on the line $x^3 x^3$ of said figure, and Fig. 3 is a transverse vertical section taken on the line $x^4 x^4$ of Fig. 1.

Of the parts of the bicycle shown, 1 indicates the crank-shaft hanger; 2, the seat-post tube; 3, the bottom front tube; 4, the pronged back tubes or stays, and 5 the rear bottom tubes. In this construction the crank-shaft hanger 1, for a purpose which will hereinafter appear, is made much larger than is usual. The bottom tubes 5 are expanded in a vertical direction at their forward ends and open into the hanger or cylinder 1, and the rear ends of the tubes 4 and 5, which are on the same side of the machine, are tied together by flattened yokes or O-shaped brackets 6.

7 indicates a portion of the rear or traction wheel of the machine, and 8 the barrel-like hub of the same.

9 indicates the rear spindle, the ends of

which are screw-threaded and passed through perforations in the yokes 6.

10 indicate nuts which work on the screw-threaded ends of the spindle 9 and clamp the yokes 6, and thus rigidly secure said spindle so that it cannot turn. Bearing-cones 11 on the spindle 9 cooperate with ball-runways 12 in the ends of the hub 8 and bearing-balls 13, running between said parts. The hub 8 is provided at each end with a small bevel-gear 14, for a purpose which will presently appear.

The ends of the cylindrical crank-shaft hanger 1 are closed by means of heads 15, which, as shown, are removably secured in place by screw-threaded engagements.

16 indicates the pedal crank-shaft, which is provided with a pair of opposite crank portions 17, that run entirely within the dust-tight case formed by the crank-shaft hanger 1 and the heads 15. The trunnion portions of this crank 16 are passed through the centers of the heads 15 and are provided with bearing-cones 18, that cooperate with ball-runways 19 on said heads 15, and with bearing-balls 20, that run between said parts 18 and 19. Each outwardly-projecting end of the crank-shaft 16 is provided with a crank-arm 21, having an ordinary pedal 22.

Mounted for reciprocating non-rotary movement within the forward end of each of the rear bottom tubes 5 is a plunger or head 23, the forward end of which is connected to the cooperating crank portion 17 of the crank-shaft 16 by means of a pitman or rod 24. As shown, the pitman connections 24 are relied upon to prevent the plungers or heads 23 from rotating in their seats; but it is of course obvious that any other of the well-known constructions for preventing rotation of a reciprocating body might be employed by way of addition or substitution. These plungers or heads 23, it will be noted, will be reciprocated in reverse order when the pedal crank-shaft 16 is rotated.

25 indicates the tubular member, and 26 the rod or screw-threaded member, of a pair of telescoping sections which cooperate in pairs and are mounted one pair within each of the frame-tubes 5. The sections 25 are mounted for rotary movement, but fixed against axial

movement by means of ball-bearing mountings involving bearing-cones 27 on said sections 25, ball-runways 28 within the tubes 5, and bearing-balls 29. At their projecting rear ends the sections 25 are provided with bevel-gears 30, which run in mesh one with each of the bevel-gears 14 on the hub 8 of the traction-wheel 7.

The screw-rod section 26 is provided with a spiral cam-groove 31, in which cam-lugs 32, formed on the interior of the tubular section 25, work with a cam action. The forward ends of the cam-rods 26 are formed with ratchet-teeth 33 and work within suitable seats formed within the rear ends of the plungers or heads 23. Centrally-located bearing-balls 34 are placed between the forward ends of the rods 26 and the bottoms of their seats, and a series of balls 35, held in place by annular nuts 36, engage shoulders or cone portions 37 on said rods 26 to prevent the endwise separating movement of said rods 26 and the cooperating plungers 23. A series of pawls 38 work through suitable seats in the plungers or heads 23 and engage the ratchet-teeth 33 on the cam or screw rods 26. As shown, flat springs 39, secured on the plungers 23, put the pawls 38 under tension to move inward and keep engagement with the cooperating ratchet-teeth 33.

With the construction above described it is obvious that when either one of the plungers or heads 23 is under the crank action forced rearward the cooperating cam or screw rod 26 will also be forced rearward, and being held against rotation in the direction which the strain would tend to turn the same by means of the pawls 38 and ratchet-teeth 33 will cause the rotation of the sleeve 25 and bevel-wheel 30, as indicated by arrows marked thereon, thus giving the advance movement to the traction-wheel 7. Under the reverse movement of the plunger or head 23 the screw or cam rod 26 will also be drawn forward, but will be permitted to rotate by the pawls 38, so that it will not impede the forward or advancing movement of the machine.

As the cranks 17 and plungers or heads 23 operate in alternate order, it is evident that prac-

tically a continuous application of the driving power is given under the pedaling action. Great power and very high speeds are claimed for this machine. It is thought to be novel, and it is certainly very desirable to run the cranks within the crank-shaft hanger and to utilize the rear bottom frame-tubes for guides for the reciprocating parts. This construction keeps the incased parts free from dust and prevents the clothes of the rider from being caught.

Of course it will be understood that eccentrics ought to be substituted for the pitman-cranks on the crank-shaft and that the inner detents of the construction might be changed without departing from the spirit of our invention.

What we claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a power-transmitting device, the combination with a fixed tubular guide, of a rotary sleeve or nut section within said tubular guide, a non-rotary plunger or head mounted to reciprocate within said guide, and the screw-threaded plunger or stem swiveled to said reciprocating head and connected therewith by a one-way pawl-and-ratchet device and having a screw or camming action on said rotary sleeve, substantially as described.

2. In a power-transmitting device, the combination with a fixed tubular guide, of a rotary sleeve or nut section within said guide, a non-rotary plunger or head mounted to reciprocate within said guide, a crank-driven link or rod connected to said plunger or head, and a screw-threaded stem swiveled to said reciprocating plunger or head and connected therewith by a one-way pawl-and-ratchet device and having a screw or camming action on said rotary sleeve or nut, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

OLIVER N. OLSON.
CHARLES H. SMITH.
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Witnesses:

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