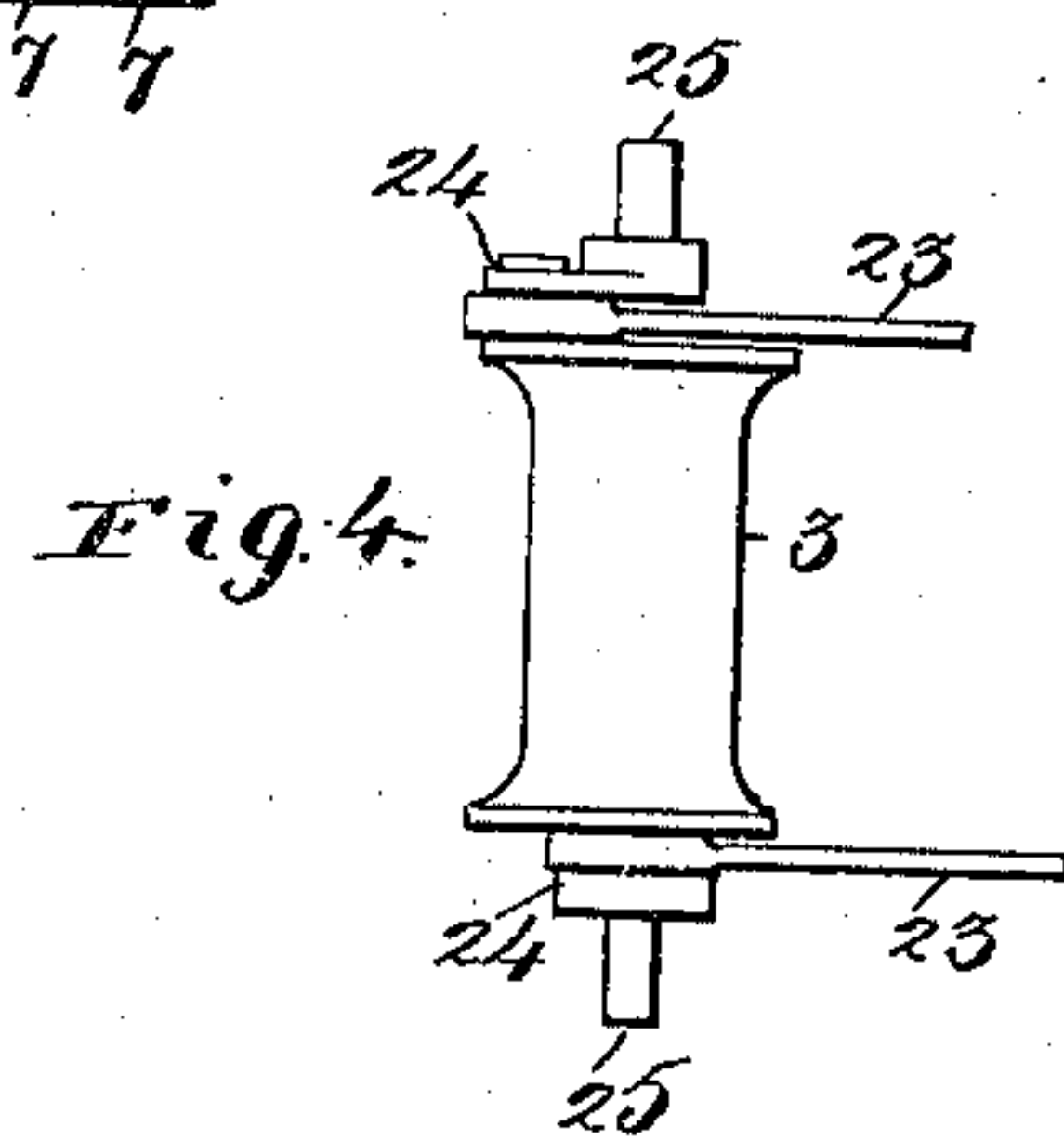
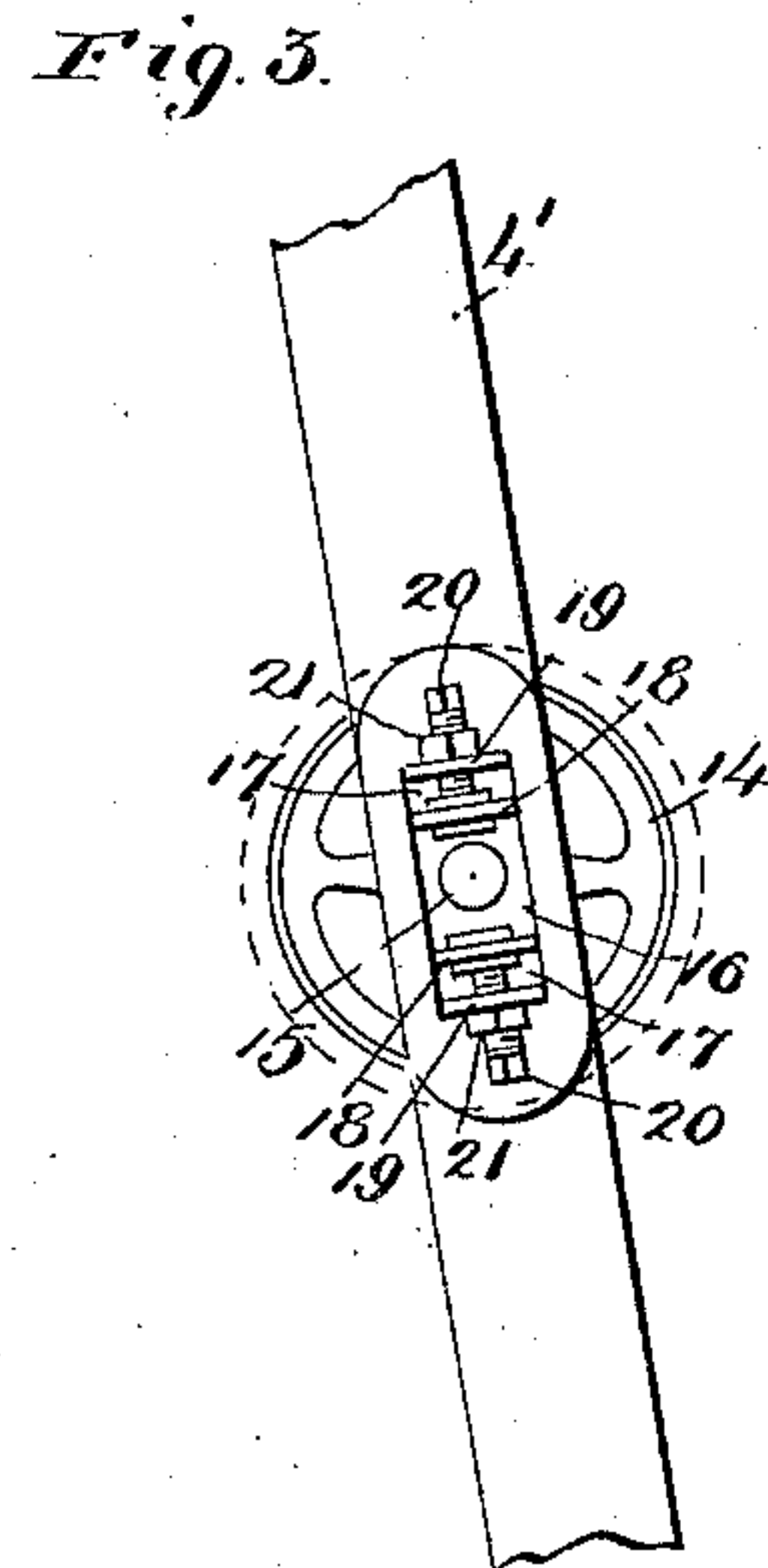
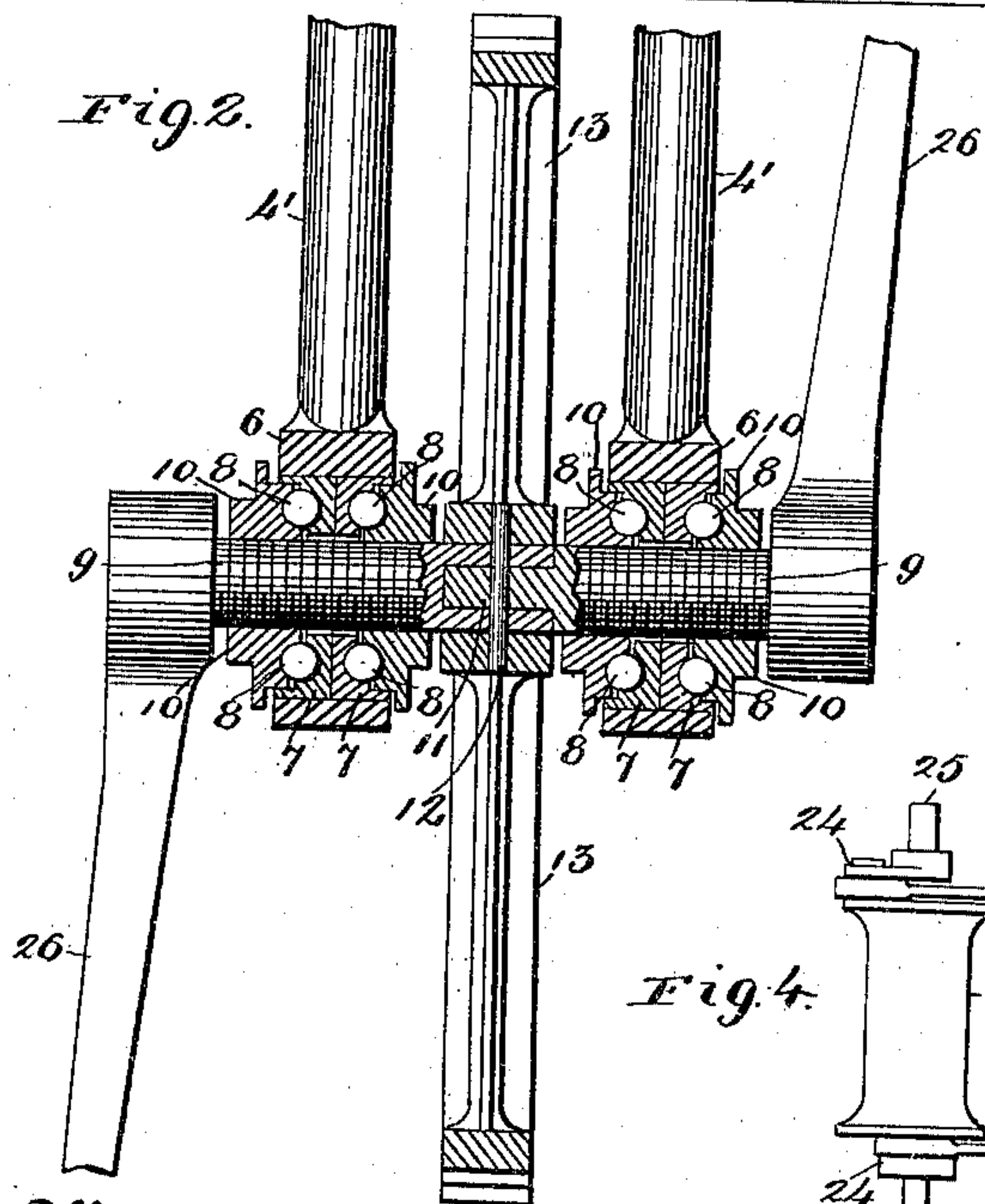
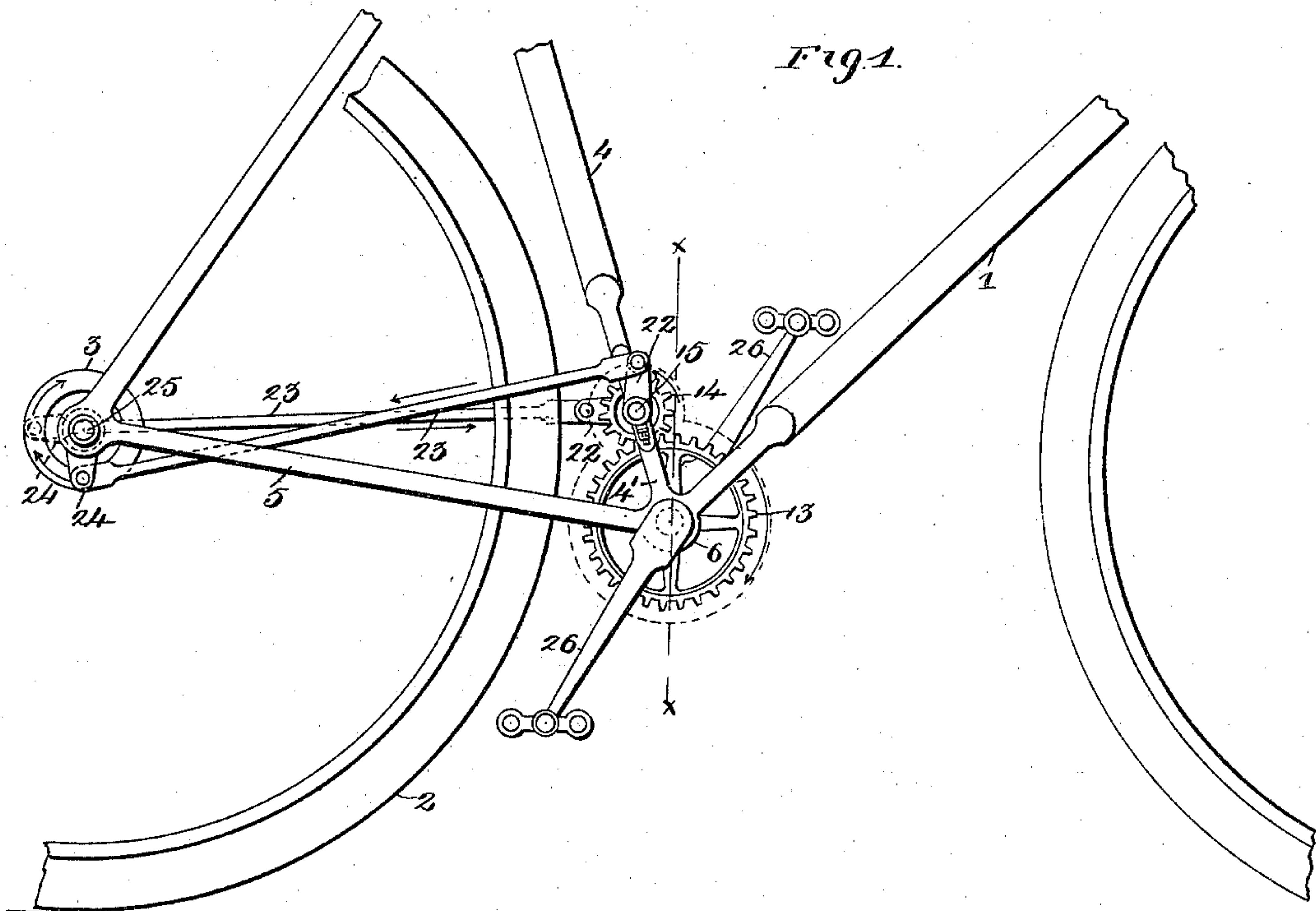


(No Model.)

S. G. LIVINGSTON.
RUNNING GEAR FOR BICYCLES.

No. 598,525.

Patented Feb. 8, 1898.



Witnesses
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UNITED STATES PATENT OFFICE.

SAMUEL G. LIVINGSTON, OF ST. LOUIS, MISSOURI.

RUNNING-GEAR FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 598,525, dated February 8, 1898.

Application filed May 27, 1896. Serial No. 593,275. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL G. LIVINGSTON, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Running-Gears for Bicycles, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part thereof.

My invention has relation to improvements in bicycles; and it consists in the novel arrangement and combination of parts more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a side elevation of my invention. Fig. 2 is an enlarged section on the line xx of Fig. 1. Fig. 3 is a side elevation, enlarged, showing in detail the manner of adjusting the position of the shaft of the pinion carried at the base of the saddle-post, the crank-arms being removed from the shaft; and Fig. 4 is a plan view of the hub of the hind wheel.

The present invention is an improvement on the construction described in my application for Letters Patent, filed June 10, 1895, Serial No. 552,248, allowed January 20, 1896, and, like it, has for its object to construct a running-gear for bicycles which will dispense with the ordinary endless chain and sprocket generally employed for the purpose of impelling the machine, to reduce the friction incident to the use of such sprocket chain and wheel, to prevent the accumulation of dirt and foreign matters generally gathered up by such chain during the running of the bicycle, and to devise a gear which shall be simple in construction and effective in all respects. The double internally-gear-driven wheels, however, are here dispensed with, a single externally-gear wheel being substituted. The present construction presents the same advantages as that of the application above referred to in that the front ends of the connecting-rods of the driving mechanism remain above and clear the horizontal rear fork of the machine, thus permitting the narrowing of the tread not otherwise conveniently attainable.

In detail the invention may be described as follows:

Referring to the drawings, 1 represents the

member of the frame which extends from the pedal-shaft to the front post, (not shown,) and 2 the rear wheel of the machine, provided with the usual hub 3.

4 represents the saddle-post, the lower extremity of which in the present instance is forked, the members of the fork being represented by 4'. The members 5 of the horizontal rear fork, the members 4' of the saddle-post, and the forked lower end of the member 1 form at their meeting ends the loops 6, which, as subsequently to be explained, form bearings for the opposite ends of the pedal-shaft. Into each loop 6, and from each side thereof, is driven a cup 7, each cup having formed along the exterior face thereof an annular groove for the reception of ball-bearings 8 and each cup having a central opening for the free passage of the sectional pedal-shaft 9. Over the exteriorly-screw-threaded portion of each section of the pedal-shaft, or that portion which passes through the cups, and made to bear against the ball-bearings 8, are passed the cap-pieces 10, said cap-pieces serving as the immediate supports or bearings for the sectional pedal-shaft. In the rotation of the latter the cap-pieces bear against the ball-bearings confined in the embracing-grooves of the cups and cap-pieces, respectively, the cups being firmly held within the loops 6, as previously described. The inner end of one section of the pedal-shaft is provided with a socket into which the reduced extension 11 of the adjacent section fits, the parts being united by a pin 12, which at the same time serves to secure to the pedal-shaft the large externally-gear-driven wheel 13, mounted between the forked members of the saddle-post.

Mounted between the members 4' above the pedal-shaft and adapted to mesh with the teeth of the driving gear-wheel 13 is a pinion 14, disposed in the plane of rotation of the gear-wheel 13, the shaft 15 of which is carried by the blocks 16, adapted to slide and be made adjustable in the slots 17, formed in the lateral walls of the forked members 4'. Forming a part of each block is a terminal lug 18, through which and through a corresponding lug 19, formed at the ends of the slot 17, passes a bolt 20, carrying at its outer end an adjusting-nut 21 for accurately adjusting the

position of the shaft-supporting blocks 16 and thus accurately bringing the teeth of the pinion and driving-gear into mesh with each other. Carried by the outer ends of the shaft 5 15—that is, the ends projecting beyond the bearing-blocks 16 and fork members 4' and disposed ninety degrees to one another—are the crank-arms 22, to the free end of each of which is secured pivotally one end of a connecting-rod 23, whose opposite end pivotally 10 connects with the free end of a crank-arm 24, carried at each end of the hub 3. The crank-arms 24 are also disposed at an angle of ninety degrees to one another, leaving the bearings 15 25 in the same straight line, the said bearings being embraced by the rear portion of the frame of the machine. Since the driving-gear 13 is externally geared (instead of internally, as in my invention above referred 20 to) it will revolve the pinion 14 in the opposite direction, as seen by the arrows in Fig. 1, but by reason of the angular disposition of the crank-arms referred to the connecting-rods will cross each other, as it were, impelling 25 the wheel 2 always in the proper direction—that is, forward—the dead-centers being always overcome in any position of the pedal-arms 26. The pedal-arms are formed integrally with the sections of the pedal-shaft by 30 which they are carried.

By the construction of the pedal-shaft and bearings therefor the former is rotated with a minimum amount of friction. Besides the device can be readily taken apart and re- 35 paired.

By mounting the pinion 14 in the plane of rotation of the gear-wheel 13 the narrowness of the tread of the pedal-shaft or distance between its pedal-arms is insured by reason of 40 the specific connection between the operating-shaft of the pinion and the rear hub.

Having described my invention, what I claim is—

1. In a bicycle, a suitable frame having a 45 rear horizontal fork, a saddle-post, a pedal-shaft mounted at the lower end of the saddle-post, a driving gear-wheel fixed to the pedal-shaft, a second shaft mounted above the pedal-shaft, crank-arms carried at the ends of 50 the second shaft, a pinion carried by the second shaft meshing with the teeth of the driving gear-wheel, a hub for the rear wheel of the machine, crank-arms fixed to the opposite ends of the same and having their bearings 55 in the rear portion of the frame of the machine, and connecting-rods connecting the

crank-arms of the hub and shaft carried by the saddle-post, whereby the front ends of the said rods will remain above the rear horizontal fork, substantially as set forth. 60

2. In a bicycle, a suitable frame having a rear horizontal fork, a saddle-post, a pedal-shaft mounted at the lower end of the saddle-post, a driving gear-wheel fixed to the pedal-shaft, a second shaft mounted above the 65 pedal-shaft, crank-arms carried at the ends of the second shaft, a pinion carried by the second shaft meshing with the teeth of the driving gear-wheel and disposed in the plane of rotation thereof, a hub for the rear wheel of 70 the machine, crank-arms fixed to the opposite ends of the same and having their bearings in the rear portion of the frame of the machine, and connecting-rods connecting the crank-arms of the hub and pinion-shaft, 75 whereby the front ends of said rods will remain above the rear horizontal fork and whereby the narrowness of the tread of the pedal-shaft is insured, substantially as set forth. 80

3. In a bicycle, a suitable frame having a rear horizontal fork, a saddle-post, a lower forked end for the saddle-post, the members of the horizontal fork, and the members of the 85 forked end of the saddle-post, and the forked end of the member leading to the front post meeting at a common point on each side of the machine-frame and forming loops, a pedal-shaft mounted between said loops, a driving 90 gear-wheel carried by the pedal-shaft and located between the members of the several forks, a second shaft adjustably mounted above the driving gear-wheel between the members of the forked end of the saddle-post, 95 crank-arms making an angle of ninety degrees with one another carried at opposite ends of the second shaft, a hub for the rear wheel of the machine, crank-arms making an angle of ninety degrees with one another disposed at opposite ends of the hub, suitable 100 bearings for the crank-arms of the hub, and connecting-rods pivotally connecting the crank-arms of the hub with the crank-arms of the second shaft carried by the forked end of the saddle-post, the parts operating as and for 105 the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL G. LIVINGSTON.

Witnesses:

LEE SALE,
EMIL STAREK.