No. 633,204. Patented Sept. 19, 1899.

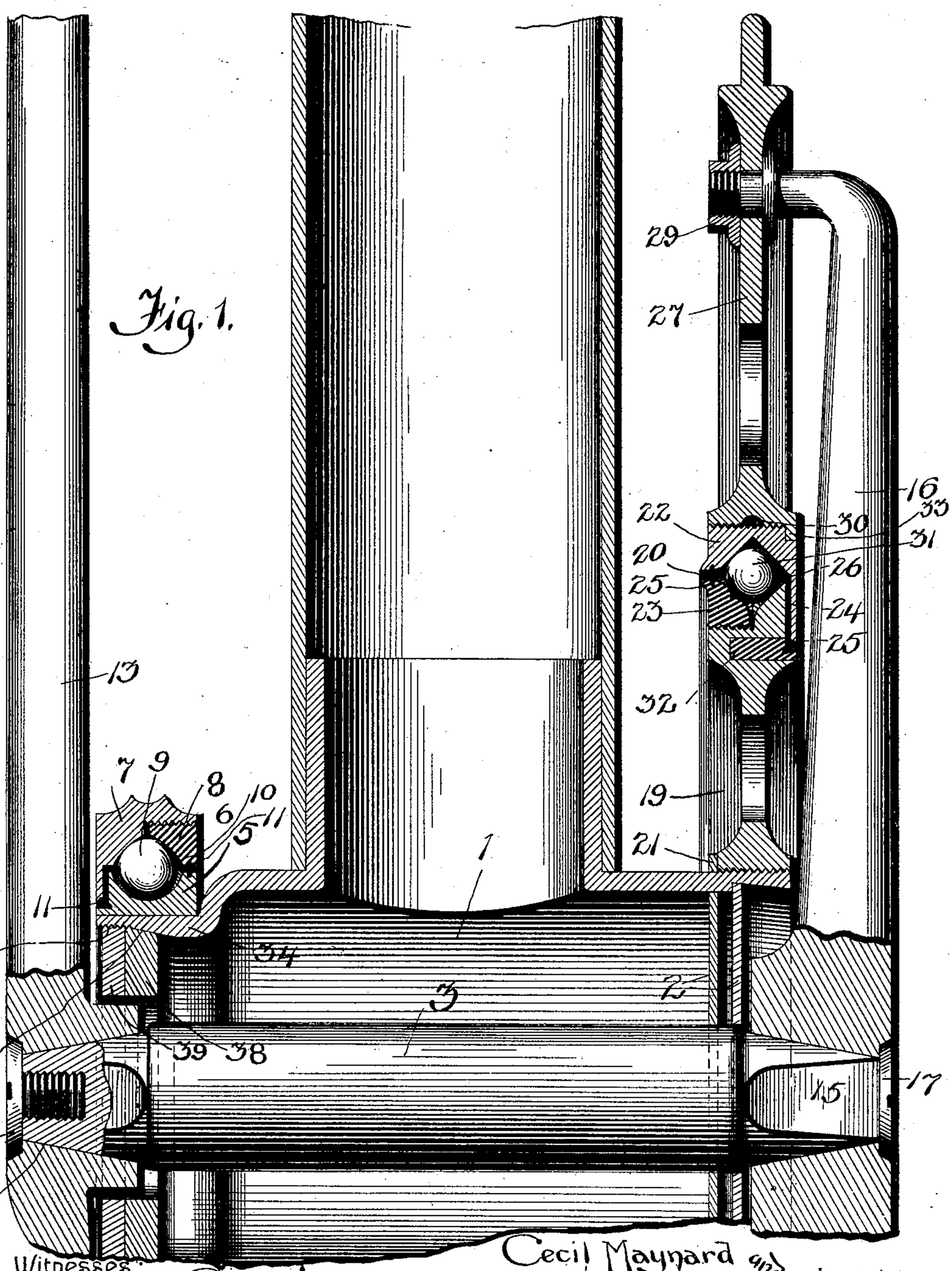
C. MAYNARD & E. FREDERICK.

CYCLE PROPELLING MECHANISM.

(Application filed July 23, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

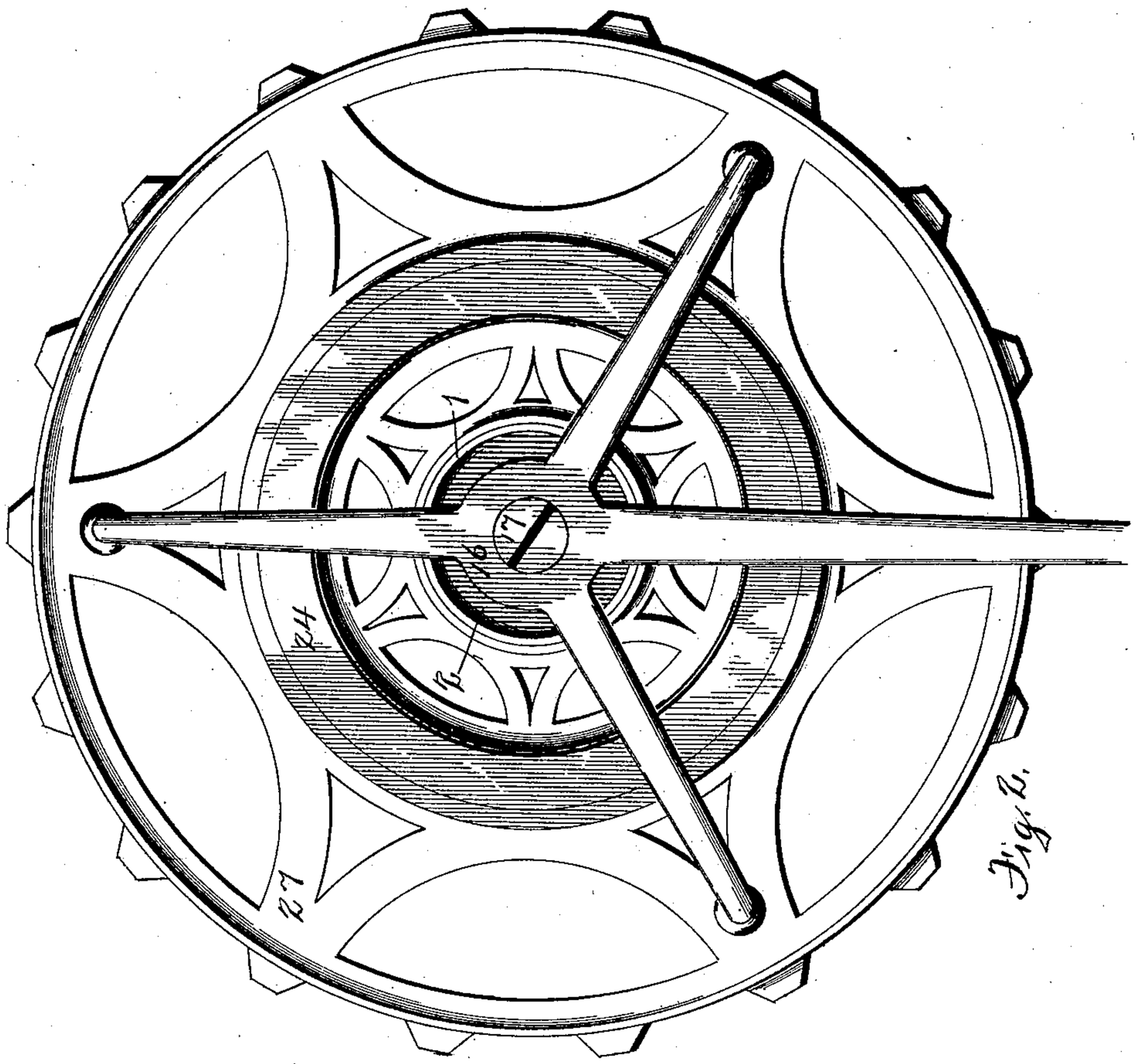

Fig. 2.

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Fig. 4.

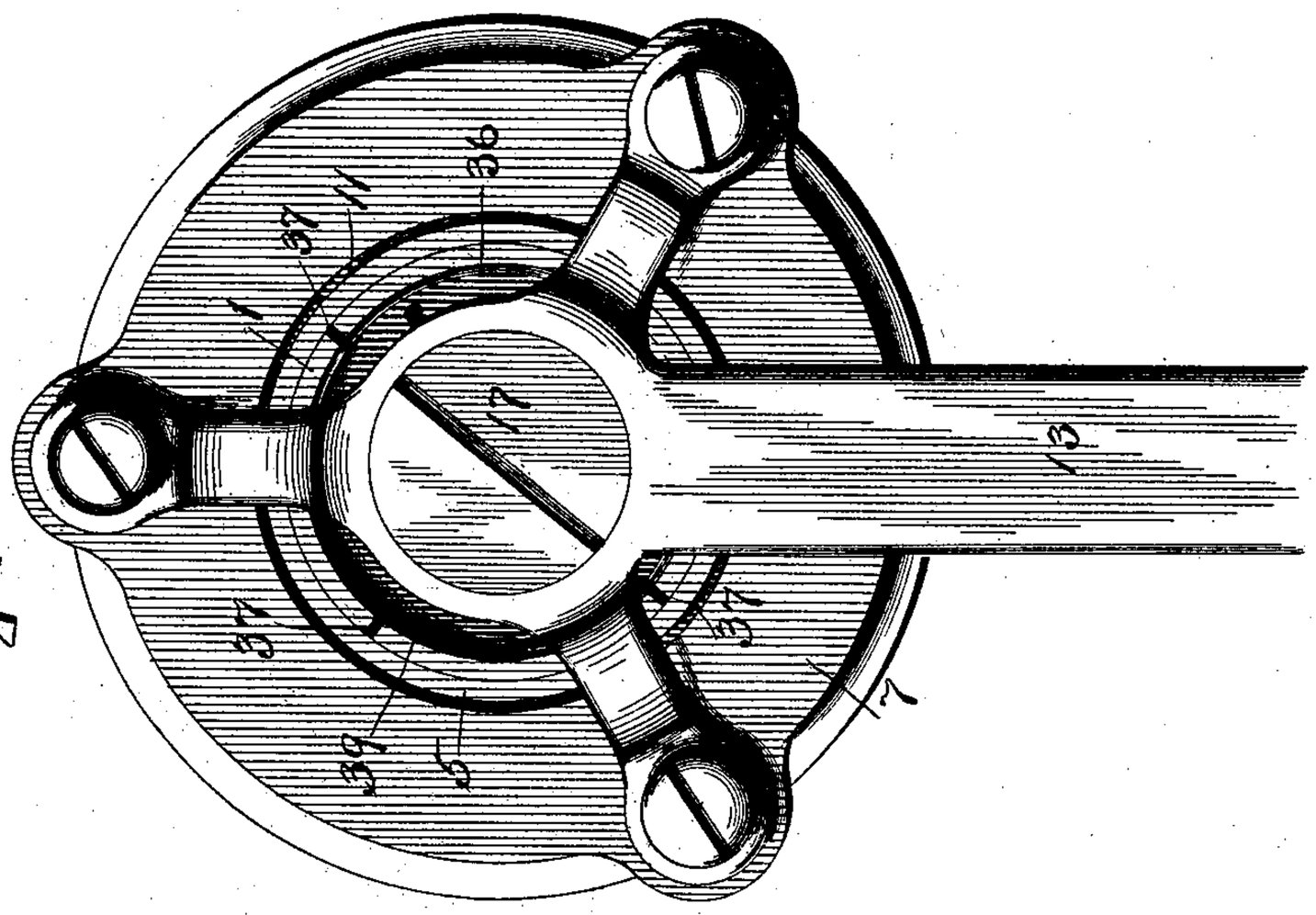
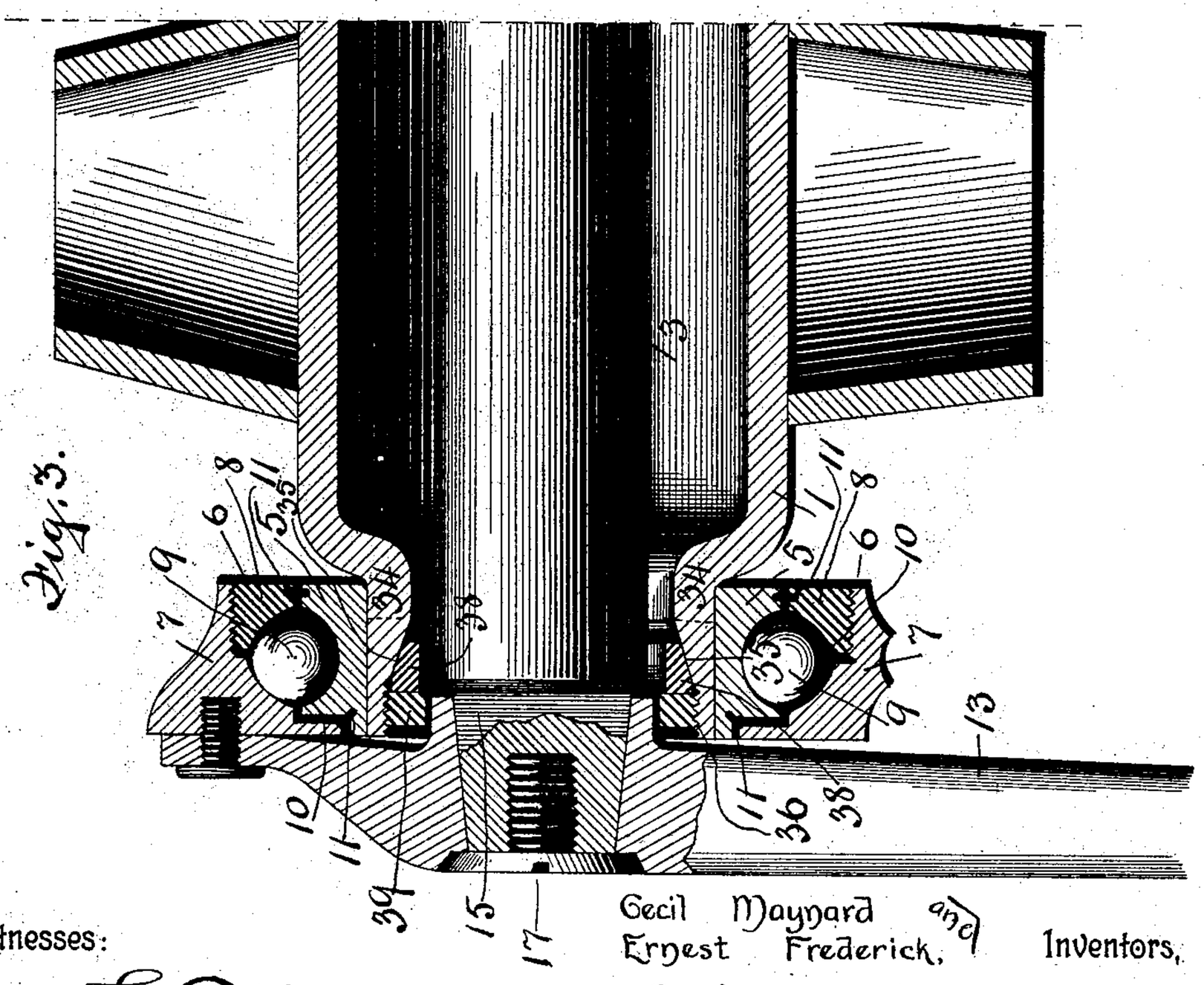


Fig. 3.



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Horace G. Deitz
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UNITED STATES PATENT OFFICE.

CECIL MAYNARD AND ERNEST FREDERICK, OF CAMPBELLFORD, CANADA.

CYCLE PROPELLING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 633,204, dated September 19, 1899.

Application filed July 23, 1898. Serial No. 686,678. (No model.)

To all whom it may concern:

Be it known that we, CECIL MAYNARD and ERNEST FREDERICK, subjects of Her Majesty the Queen of Great Britain, residing at Campbellford, county of Northumberland, Province of Ontaria, Canada, have invented certain new and useful Improvements in Cycle Propelling Mechanisms, (for which Letters Patent of Great Britain were granted August 10, 1898, No. 17,256, and French Letters Patent granted November 22, 1898, No. 280,471, the application for which was duly filed August 10, 1898, Serial No. 268,284;) 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.

Our invention relates to improvements in cycle propelling mechanism, and has particular relation to the construction and arrangement of the crank-hanger, crank-shaft, and its bearings, together with the drive-sprocket and cranks.

The object of our invention is to provide a propelling mechanism in which the drive-sprocket is mounted directly over its bearings.

A further object is to provide a crank which is removably secured to the drive-sprocket and to the crank-shaft.

A further object is to provide a drive-sprocket formed in sections, one of which sections is removably secured to the crank-hanger, the other having a movement about the inner section.

A further object is to provide a propelling mechanism in which all torsional strain is prevented.

A further object is to provide means for the easy change of sprocket-wheels of varying size.

A further object is to provide a propelling mechanism in which the bearings are located without the crank-hanger.

A further object is to provide mechanism for holding the bearings in position on the outer periphery of the crank-hanger.

A further object is to provide a propelling mechanism in which each crank-arm is removably connected to the crank-shaft and to its bearings.

A further object is to provide a ball-bearing propelling mechanism in which the crank-shaft is independent of the bearings, serving only to connect the crank-arms.

A further object is to provide a propelling mechanism of narrow tread, neat and attractive appearance, durable construction, simple operation, and which can be made at a moderate cost.

To these ends our invention consists in the improved construction and combination of parts hereinafter fully described, and particularly pointed out in the appended claims.

In the drawings, in which similar numerals of reference indicate similar parts in all of the views, Figure 1 is a horizontal cross-sectional view of a portion of a cycle-frame, showing the crank-hanger, the crank-shaft and bearing, the sprocket, and the cranks. Fig. 2 is an elevation showing the sprocket and crank. Fig. 3 is a sectional view showing a different manner of mounting the bearing. Fig. 4 is a side elevation showing the manner of attaching the crank-arm to the device shown in Fig. 3.

Bicycle propelling mechanism as produced at the present time has several disadvantages, among which is to be found the tendency of a side pull on the crank-shaft and bearings caused by the placing of the sprocket outside of the bearing on which the crank-shaft revolves and necessitating the placing of the sprocket directly onto the crank-shaft. When the pedals are being operated and the drive-wheel placed in motion, the pull exerted by the chain has a tendency to pull the crank-shaft toward the wheel being driven and causes the crank-shaft to pass out of true alinement, bind, and cause an unequal wear on the balls and bearings. Another disadvantage is found in the inability to make a true narrow-tread wheel by reason of the sprocket being connected directly to the crank-shaft, thus throwing the sprocket a greater distance from the center of the crank-hanger. In our construction the width of the tread is limited only by the size of the parts of the framework, the sprocket being connected to the crank-hanger and the rotatable portion of the sprocket mounted directly over the fixed portion, the raceway for the balls being formed between the two portions of the sprocket. With this construction all pull or leverage of the chain, &c., will be placed

directly on the ball-bearing, while the fact that this bearing lies directly in alinement with the moving chain prevents any side pull or leverage, the results obtained proving that the chain operates in a manner suitable to its operation if placed on the ball-bearing direct.

In the description following we have set forth an operative mechanism; but we do not limit ourselves to such precise construction, claiming the right to use any and all modifications that may be found necessary and desirable and which will fall within the scope of the appended claims.

1 designates a crank-hanger secured in the framework in a suitable manner, as by brazing, &c., being provided near one of its ends with suitable dust-plates 2, through which the crank-shaft 3 is adapted to pass. The crank-hanger 1 has one of its ends (shown at the left in the drawings) reduced in size, as shown at 34, having its interior provided with a beveled portion 35 and a screw-threaded portion 36. In addition the reduced end is provided with kerfs, (shown in Fig. 4,) which extend inwardly a suitable distance.

Mounted on the reduced end portion of the crank-hanger is the inner section 5 of a cone 6, which forms one of the bearings. The outer section 7 of the cone is formed in two parts, the portion 8 being adapted to be screwed into the portion 7 until its face contacts against the series of balls 9, having movement in the raceway 10, formed between the sections of the cone. Suitable washers 11, preferably formed of felt or similar material, are secured between the sections, in order that entrance of dust, &c., to the raceway may be prevented. The opposite ends of the crank-shaft 3 are formed square, as at 15, the squared portion being greatly reduced toward the end, said squared portion being adapted to receive the crank-arms 13 and 16, each of which is provided with an opening for the reception of the said squared portion, the connection being by means of a suitable screw 17, screwed into the end of the crank-shaft, as best shown in Fig. 1. The crank-arm 13 is formed, as shown in Fig. 4, having a triangular connection with the member 7 of the cone, said member being preferably constructed with the configuration shown in Fig. 4. To secure the cone 6 in position on the reduced end portion, and thus hold the crank-arm 13 in a fixed position, preventing any movement of such arm other than a rotary one, we make use of a suitable beveled ring 38, which contacts with the face 35, said ring being forced inwardly by the screw-threaded ring 39. It will be readily seen that as the ring 38 is forced inwardly by the movement of the ring 39 the crank-hanger end, having the kerfs 37, which practically divide the end into sections, will be forced outward into fixed contact with the inner member 5 of the cone 6. When it is desired to move this cone, it is necessary only to remove the ring 39, when the ring 38 will be automatically forced from its position, freeing the binding-contact between the end portion of the crank-hanger and the inner section 5.

The right-hand side of the crank-hanger is provided with peripheral screw-threads, on which is adapted to be removably secured the inner portion 19 of the sprocket-wheel, said inner portion forming practically the inner section of the cone 20, as best shown in Fig. 3. The inward movement of the portion 19 is prevented by a stop 21, secured in the crank-hanger, this position being maintained during the movement of the sprocket-wheel by reason of the fact that the portion 19 is not moved during the sprocket-wheel's rotation.

The cone 20 is formed, preferably, as shown in Fig. 1, comprising three members 19, 22, and 23, the latter being the tightening member and preferably formed with two contacting points. The member 22 has its outer face extending inwardly to form a face-plate 24, which in connection with a suitable washer 25 serves to prevent the entrance of dust to the raceway 26, the opposite side of the cone being provided with a similar washer. The sprocket-wheel 27 is secured to the member 22 of the cone by suitable screw-threads and is adapted to be rotated by means of the crank-arm 16, which is preferably secured to the sprocket-wheel 27 at three points, as best shown in Fig. 2, said construction presenting a greater amount of stability, the connection being by suitable means, such as a nut 29, mounted on the screw-threaded end of the crank-arm 16. A suitable oil-channel 30 is provided in the sprocket, said channel having connection with the raceway 26, within which the balls 31 have their movement. A suitable plate 32 may be placed in the section 19, if desired, said plate serving to form a support for the washer 25.

In assembling the sprocket-wheel the section 22 is first screwed into the sprocket until it contacts with an annular stop 33, formed on said sprocket, after which the portion 19 is placed in its proper position relative to the section 22. The balls are then inserted in the raceway, and the tightening-section 23 is screwed into position, and thereby complete the ball-bearing for the sprocket. The portion 19 is then screwed onto the crank-hanger until it contacts with the stop 21, after which the crank-shaft is inserted, as hereinbefore described, and the screw 17 placed in position, when the parts will be ready for operation.

It will be readily seen that the size of the sprocket can be varied as desired by replacing the portion 27 with a similar portion of larger or smaller diameter, this change being readily made in an obvious manner.

As hereinbefore mentioned, the chain-pull on the sprocket is placed entirely on the ball-

bearing located in the sprocket-wheel itself, and in addition to this the tendency of the downward pull caused by the pressure placed on the crank 28 when it is passed downward is also borne by this bearing, the bearing itself preventing any liability of strain being placed on the crank-shaft, which must necessarily retain its alined position regardless of the strain or the movement of the crank 16. The chain-pull being directly on the bearing and the inner section 19 of this bearing being connected to the crank-hanger causes whatever liability of springing action there might possibly result to be placed on the crank-hanger instead of on the crank-shaft, as is now the case in the general construction of propelling mechanisms. As the crank-hanger, in addition to its normal resisting power, is braced by the dust cap or plate 2, it will be seen that this tendency would be entirely eliminated even if it were not eliminated by the fact that the sprocket-wheel itself lies directly on the balls. From this construction it will be seen that the crank-shaft is supported solely by the crank-arms 13 and 16, the latter being removably secured to the bearings, which are themselves located on the outer periphery of the crank-hanger. The crank-shaft therefore serves only to connect the two crank-arms, there being no strain whatever placed thereon, as all strain falls on the bearings, which are at a different point and have no direct connection with the crank-shaft. All tendency of a lateral movement of the crank-shaft is prevented by reason of the retaining of the bearings in a fixed position and the securing of the crank-arms, each of which is held from such movement to the crank-shaft, as shown. Another advantage is the fact that all bearings are easily removed from their positions, thus making the device one which is capable of cleansing with a minimum amount of work and which will allow of a ready assemblage of the parts, while the parts when in their operative position will be absolutely fixed and prevented from moving.

Having thus described our invention, what we claim as new is—

1. A bicycle propelling mechanism, comprising a crank-hanger; a removable stationary bearing-section located therein; a rotatable section, carrying sprocket-teeth, mounted on said stationary section, the center of said sections being on the same vertical plane; a pedal-crank removably connected to said rotatable section; a crank-shaft removably connected to said pedal-crank; a bearing removably located on the opposite side of said crank-hanger; a section rotatably mounted on said bearing; and a pedal-crank removably connected to said rotatable section, and said crank-shaft, whereby said pedal-cranks and said crank-shaft may be removed from said crank-hanger independent of said bearings, substantially as described.

2. The combination with a crank-hanger; of a sprocket-wheel rotatably mounted thereon; a bearing-section rotatably mounted on the opposite end of said hanger; a crank-shaft; and pedal-cranks removably connected to said sprocket-wheel and said section and to said crank-shaft, whereby said pedal-cranks and said crank-shaft may be removed from said crank-hanger without disturbing the operative position of said sprocket-wheel and section, substantially as described.

3. A propelling mechanism, comprising a crank-hanger; bearings formed without the periphery of said crank-hanger; and a plurality of crank-arms having a removable positive connection with said bearings and with each other.

In witness whereof we have hereunto set our hands in the presence of two witnesses.

CECIL MAYNARD.
ERNEST FREDERICK.

Witnesses:
ARTHUR B. COLVILLE,
JOHN MAYNARD.