(No Model.) 2 Sheets—Sheet 1.

C. A. JOHNSON.

BICYCLE GEARING.

No. 596,681. Patented Jan. 4, 1898.

Fig. 1.

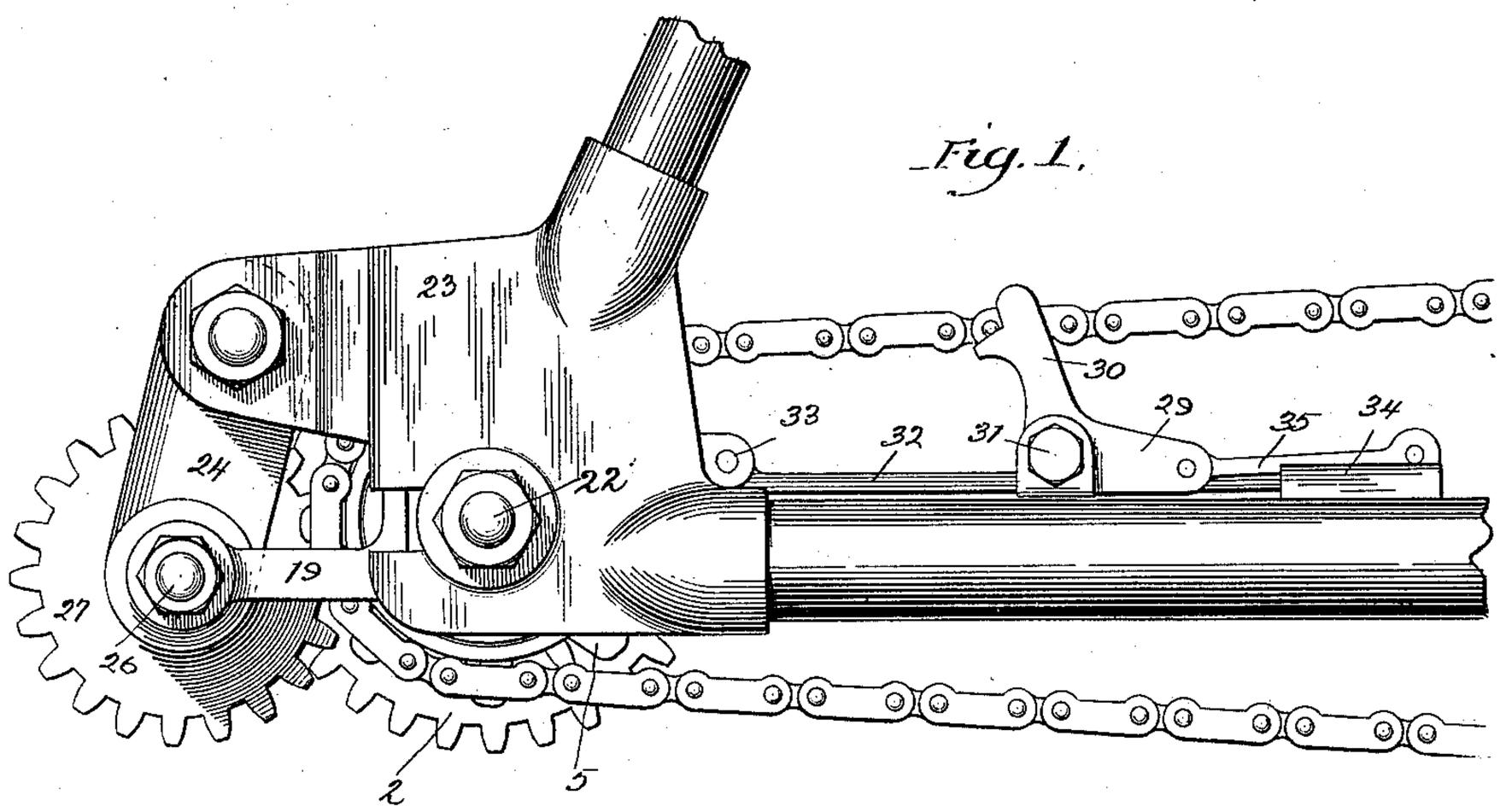
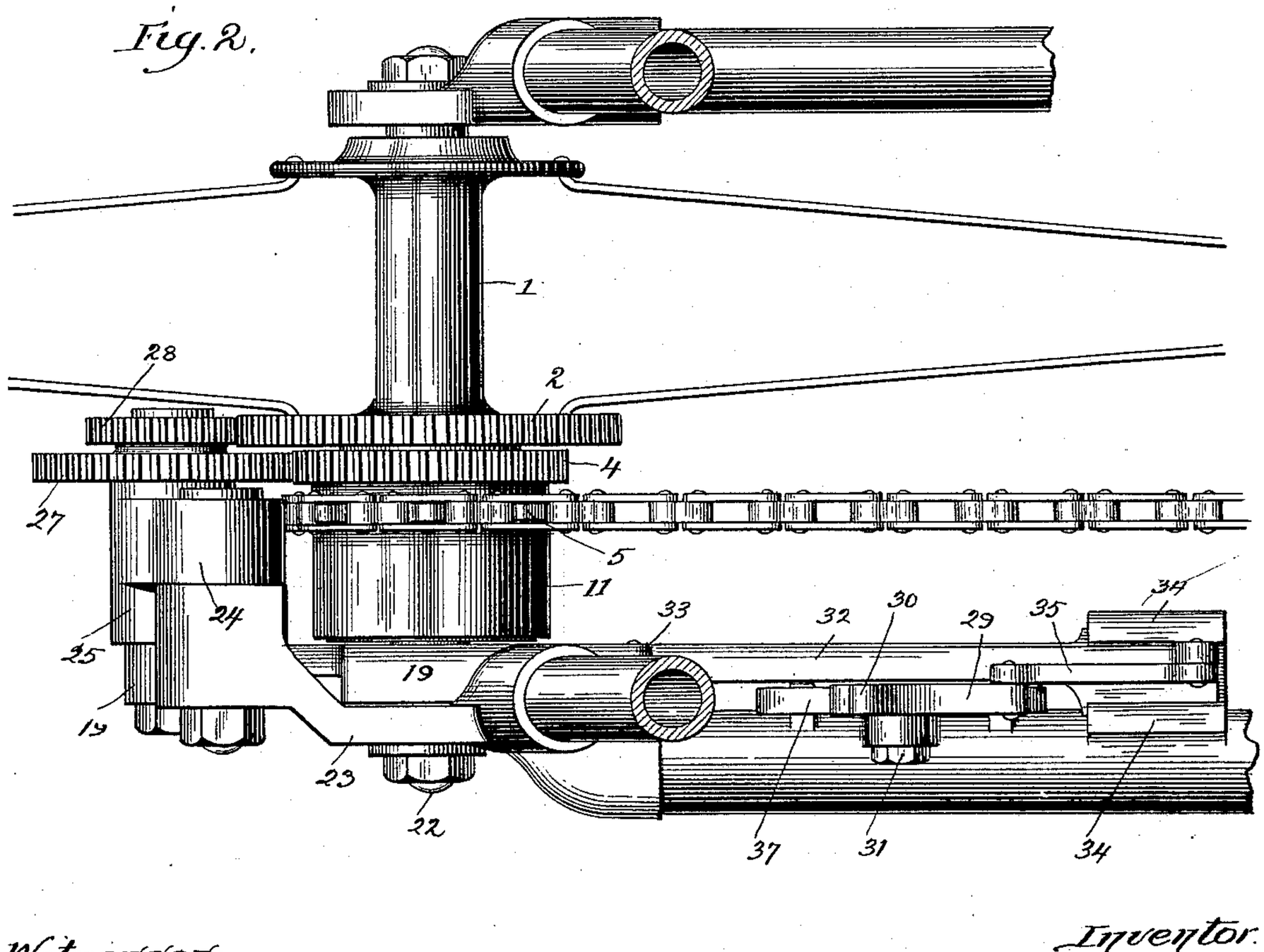


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

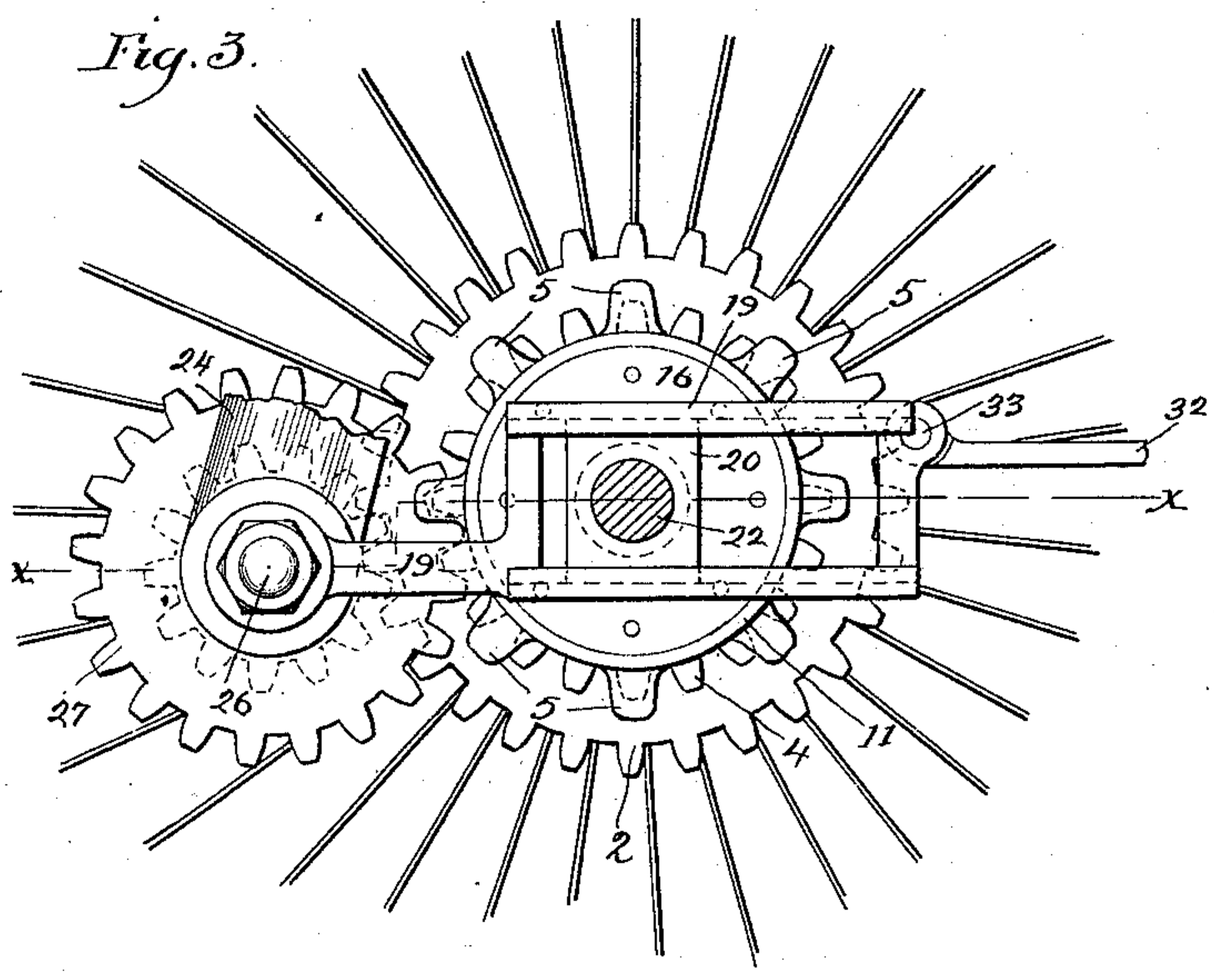


Fig. 6.

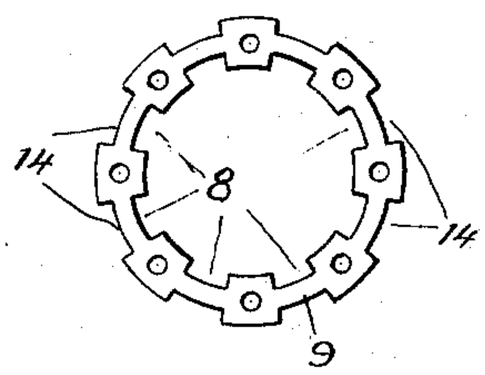


Fig. 4.

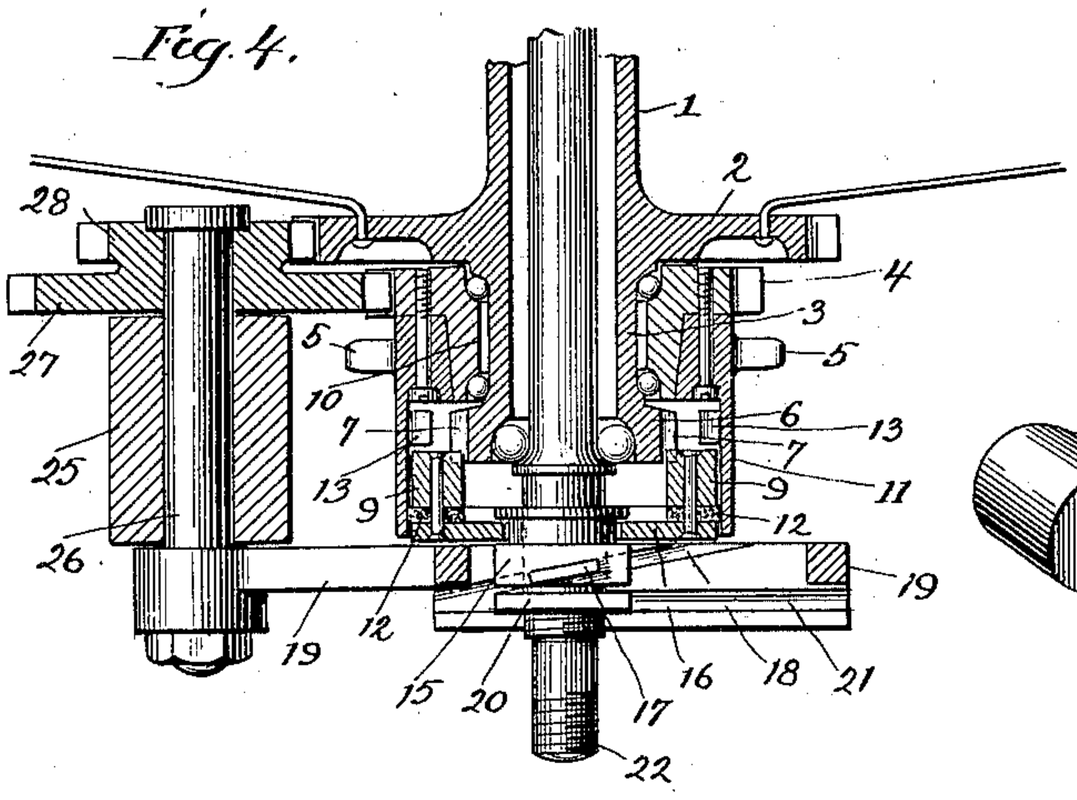


Fig. 7.

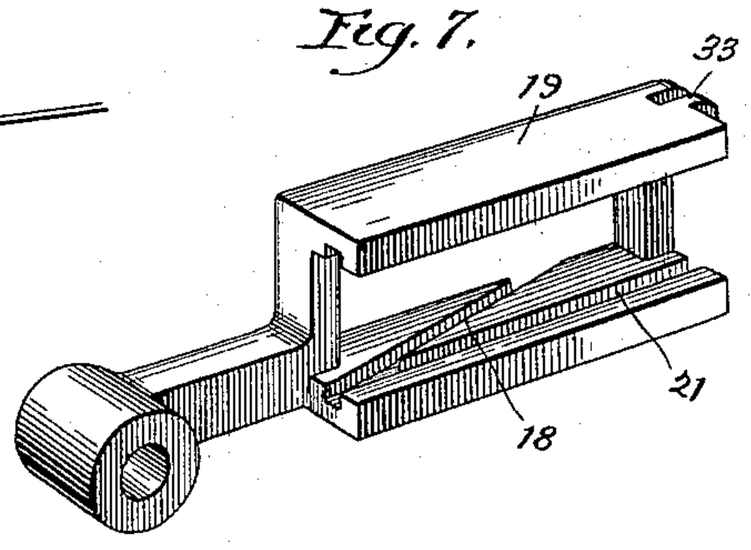


Fig. 5.

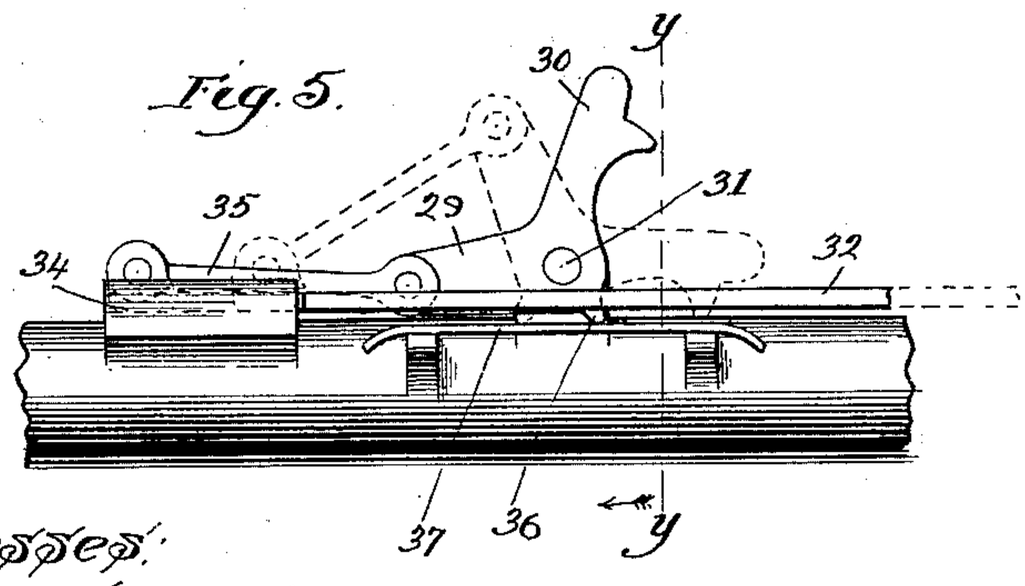
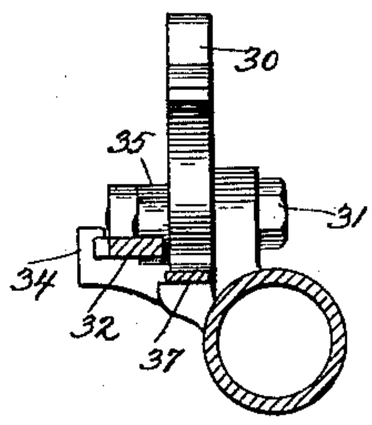


Fig. 8.



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UNITED STATES PATENT OFFICE.

CHARLES A. JOHNSON, OF EVERETT, MASSACHUSETTS.

BICYCLE-GEARING.

SPECIFICATION forming part of Letters Patent No. 596,681, dated January 4, 1898.

Application filed April 7, 1897. Serial No. 631,105. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. JOHNSON, a citizen of the United States, residing at Everett, in the county of Middlesex and State of Massachusetts, have invented a certain new and useful Improvement in Bicycle-Gearings, of which the following is a specification.

My invention relates to a new and useful improvement in bicycle-gearing, and has for its object to provide an effective means by which the speed of the drive or rear wheel of such a machine relative to the movements of the cranks may be increased or decreased, as desired by the rider, without dismounting, with the obvious result of increasing the speed of the machine or giving to the rider greater leverage for the climbing of grades or the passage over heavy road-beds.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth, and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, its construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is an elevation of a portion of a bicycle-frame, showing my improved gearing applied thereto; Fig. 2, a plan view of the same; Fig. 3, a detail elevation of the gearing and shipper-block, the remainder of the parts being broken or sectioned away; Fig. 4, a section at the line $x\ x$ of Fig. 3; Fig. 5, a detail of the shipping-lever viewed from the inside of the frame; Fig. 6, a detail of the clutch-ring; Fig. 7, a detail perspective of the sliding shipper-block; and Fig. 8, a section at the line $y\ y$ of Fig. 5, looking in the direction of the arrow.

In carrying out my invention as here shown, 1 represents the hub, which has a flange on the same end that the sprocket-wheel is secured, enlarged enough to also serve as a gear 2, or this gear may be rigidly fastened to said flange. The hub 1 projects outside of the gear 2 and forms an axle 3 for the gear 4 and sprocket-wheel 5.

The axle 3 is externally fitted for ball-bearings and at the end is internally fitted for ball-bearings, as clearly shown in Fig. 4, and at the extreme outer end is enlarged, as indicated at 6. The outer circumference of the projecting part, which extends inwardly, has small projecting teeth, (shown at 7,) which fit in the indentations or notches 8 in the clutch-ring 9. The gear 4 has a hub 10, the inside of which is fitted for the ball-bearings to reduce friction, or said wheel is rotated on the axle 3, while the outer circumference of the hub 10 is fitted for the reception of the sprocket-wheel 5, and the gear-wheel 4 is split through the center longitudinally and held together by the sprocket-wheel 5. The latter is also bolted to the gear-wheel 4 or otherwise rigidly fastened thereto in such a manner that it can be easily detached for the cleaning of the bearing. The sprocket-wheel 5 has a shell 11, made from the same stock, immovably fastened thereto, extending far enough to cover a felt washer 12 when the clutch-ring is drawn farthest out from the wheels. The shell 11 has radial projections or teeth 13, adapted to fit the indentations 14 on the circumference of the clutch-ring, and these teeth, as shown, are shorter longitudinally than the teeth or projections 7, the object being to enable the ring 9, when not in contact with the teeth 13, to still retain connection with the teeth on the axle 3, as clearly shown at 7 in Fig. 4. By this arrangement no difficulty will be experienced in sliding the ring 9 into engagement with the teeth upon the shell. The ring 9 should be long enough longitudinally to reach between the teeth 7 and 13 and the hub 10, and by so doing the teeth 13 will wear in such a way as to tend to push the projections on the ring 9 toward the center and will not tend to push the ring against the sliding collar 15.

The teeth in the axle 3 (shown at 7) will wear so as to tend to push the projections on the ring 9 out from the center, and thus said ring will rigidly connect the hub 1 or rear wheel with the sprocket-wheel 5, with the minimum stress on the sliding collar 15 and the washer 16.

Between the ring 9 and the washer 16 is placed the felt washer 12, as before described, the external circumference of which fits

tightly against the internal circumference of the shell 11, the object being to keep dust from the bearings.

In the groove on the collar 15 a felt strip may be placed, fitting tightly against the washer to serve the same purpose as that just described in connection with the washer 12, and the washer 16 is split through the center in order to fit around the collar 15. The sliding collar 15 has a round flange inside the washer 16, but that portion outside of said collar is squared, and the upper and lower sides thereof have an oblique projection 17, which fits in a correspondingly oblique groove 18 in the shipper-block 19. The nut 20 is also squared and fits in the longitudinal groove 21, formed in the shipper-block. Said nut being threaded on the axle 22 serves to keep the shipper-frame in place. 23 is a bracket, shown as part of the frame of the machine, but may be formed separate therefrom and rigidly fastened thereto, and at the rear end of this bracket is a link 24, pivotally connected thereto and provided at its lower end with a bearing 25 for the axle 26 of the gear-wheels 27 and 28. These gears are rigidly connected to their axle, so that they turn in unison, and the gear 27 meshes with the gear 4 and the gear 28 with the gear 2. When these gears mesh as described, the speed of the rear or drive wheel of the bicycle relative to the movements of the crank-shaft is lowered, and the rider has thereby an increase of leverage, which will facilitate the forcing of the machine up an incline or over a rough road-bed. The axle 26 projects through the bearing 25 and connects pivotally with the shipper-block 19, there being sufficient movement of the nut 20 to permit the rise and fall of the link incident to its swinging upon its fulcrum.

The bell-crank lever 29 and 30, which is pivoted at 31 to a portion of the bicycle-frame, is adapted to give motion to the shipper-block in the following manner: A rod 32 is pivotally connected with the shipper-block at 33 and at its outer end guided by the flanges 34 and pivotally connected to the member 29 of the bell-crank lever by the connecting-rod 35, as clearly shown in Figs. 1 and 2. From this it will be seen that when the rider presses with his foot upon the member 30 of this bell-crank lever until it assumes the position shown in Fig. 1 and in full lines in Fig. 5 the clutch-ring 9 will be caused to disconnect the sprocket 4 and hub 1 by the shipper-block moving forward. The gears 27 and 28 are drawn forward until they mesh with the gears 4 and 2, respectively. This will lower the gearing of the machine, as before described, and give the rider greater power for its forward propulsion by the consequent increase of leverage in his favor. When pressing on the member 29 of the bell-crank lever until it takes the position shown by dotted lines in Fig. 5, the shipper-block 19 by sliding backward pushes the clutch-ring 9 into engagement with the teeth 7 and 13, thereby connecting the sprocket-wheel 5 with the hub of the rear wheel of the bicycle, while at the same time forcing the gears 27 and 28 out of engagement with the gears 2 and 4, thus causing the rear wheel to revolve in unison with the sprocket-wheel 5, and when this sprocket-wheel is properly proportioned to the front sprocket-wheel of the machine the bicycle may be propelled at a much higher rate of speed, though requiring more power for the turning of the crank-shaft. By having the gears 27 and 28 behind instead of in front of the center of the gears 2 and 4 stones or other obstructions are prevented from coming between the teeth of said gears.

Formed with the lever 29 and 30 and on a line dividing the angle made by the members thereof is a small projection 36, which is acted upon by the spring 37 in such manner as to hold the lever against accidental movement in either of the two positions it is intended to assume in the manner well known in connection with pocket-knives and the like. The usual means may be provided for the regulation of the tension of the chain, but I have here not shown the same, since it forms no part of my invention.

From the foregoing description it will be obvious that a rider without dismounting may quickly change the relative speed of the rear wheel to the crank-shaft, thereby greatly facilitating the propulsion of the machine either up a considerable incline over a rough road-bed or when passing over a smooth level road-bed the speeding of the machine.

It is to be noted that when the machine is adjusted for high speed the extra gearing is out of action, and consequently the small friction generated thereby does not tend to retard this accelerated motion; but, on the other hand, when the movements of the machine are reduced consequent to the climbing of a steep grade or traveling over a rough road-bed these gears are then in action, but on account of the limited rotation thereof the friction generated thereby is small.

Having thus fully described my invention, what I claim as new and useful is—

1. In combination with a bicycle or like machine, a gear-wheel carried by the hub of the drive-wheel of such machine, a secondary gear mounted upon said hub, the rear sprocket-wheel secured to the last-named gear, gear-wheels 27 and 28 adapted to mesh with the first-named gear-wheels, and means for throwing the last-named gears in and out of mesh with the first-named gears and at the same time disconnecting or connecting the rear sprocket-wheels and parts carried thereby with the hub, as specified.

2. In combination with the drive-wheel of a bicycle or like machine, a gear-wheel 2 carried thereby, a gear-wheel 4 journaled upon the hub, a sprocket 5 revolving in unison with the last-named gear, clutch mechanism for connecting or disconnecting the hub with

the sprocket-wheel, gears 27 and 28, and means for throwing said gears into or out of mesh with the gears 2 and 4, in unison with the clutching or unclutching of the sprocket-wheel, substantially as shown and described.

3. In combination, the hub of a bicycle-wheel, a gear 2 carried thereby, a gear 4 journaled upon said hub, a sprocket 5 carried by the gear, an axle upon which the hub is journaled, a clutch-ring adapted to connect or disconnect the hub with or from the sprocket-wheel, a shipper-block for bringing about the movements of the ring, a link pivoted to the bicycle-frame, an axle carried by said link, gears 27 and 28 journaled upon said axle and revolving in unison, and means connected with the shipper-block for moving the last-named gears into and out of mesh with the gears 2 and 4, substantially as and for the purpose set forth.

4. In combination, a bicycle-wheel hub, a gear 2 carried thereby, a gear 4 journaled upon an extension of said hub, the sprocket-wheel 5 secured to the last-named gear, a shell carried by the sprocket-wheel, teeth formed within the shell, teeth formed upon the extension of the hub, a clutch-ring having indentations or notches formed therein for engagement with the two sets of teeth, a collar 15, fitted upon the axle of the hub, oblique lugs formed upon said collar, a shipper-block having oblique grooves therein in which said lugs fit, a nut 20 threaded upon the axle and fitting within the grooves 21 formed within the shipper-block, so as to guide the latter, a bell-crank lever for bringing about the movements of said block, a spring for holding said lever in either of its adjustments, a link pivoted to the frame of the machine, a connection between said link and shipper-block so as to cause the two to move in unison, an axle secured in the link, and gears 27 and 28 journaled upon said axle so as to pass into and out of mesh with the gear-wheels 2 and 4 when the clutch-ring is shifted, as specified.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

CHARLES A. JOHNSON.

Witnesses:
S. S. WILLIAMSON,
R. M. PIERCE.