(No Model.) 2 Sheets—Sheet 1.

G. C. MATHEWS.

BICYCLE.

No. 602,461. Patented Apr. 19, 1898.

Fig. 1.

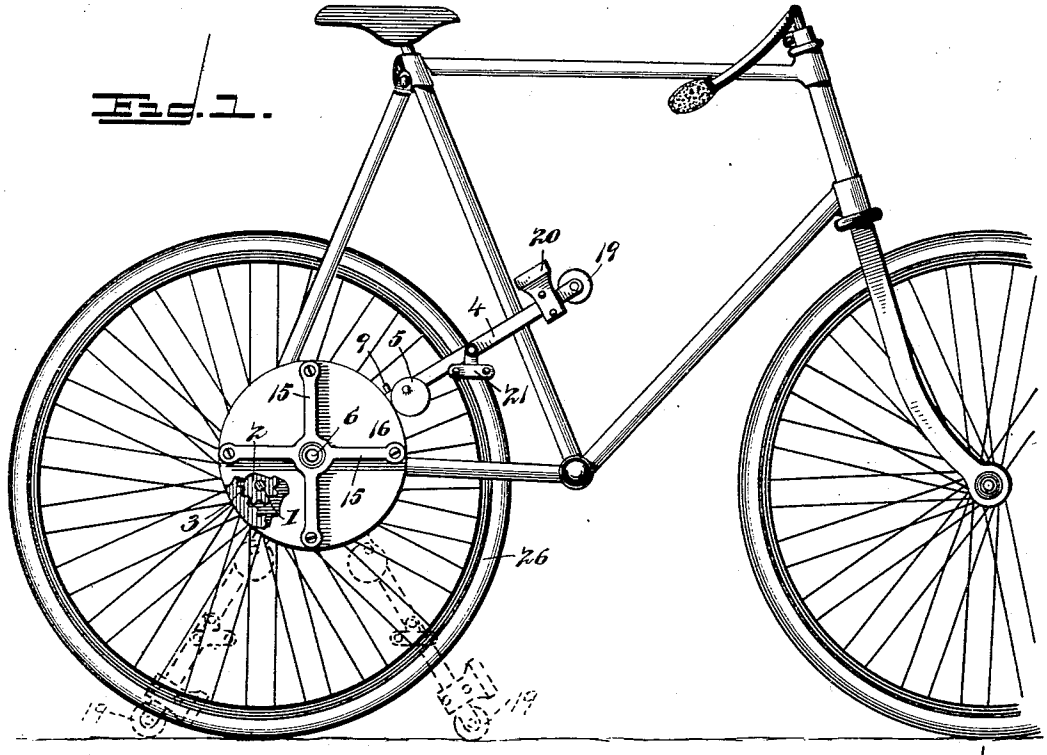


Fig. 2.

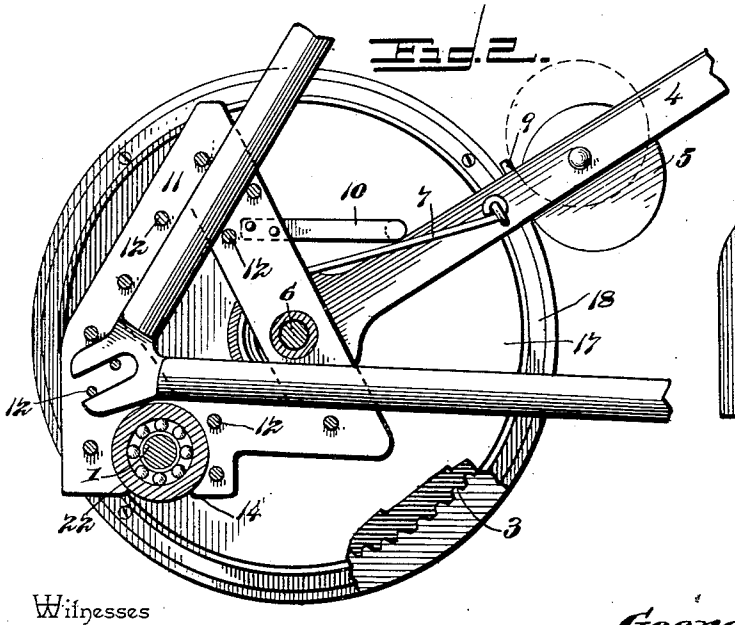
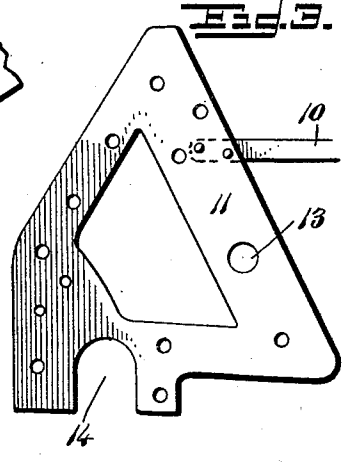


Fig. 3.



Witnesses
E. F. Stewart.
C. B. Hillyard.

Inventor
George C. Mathews
By Ivis Attorneys,
C. A. Snow & Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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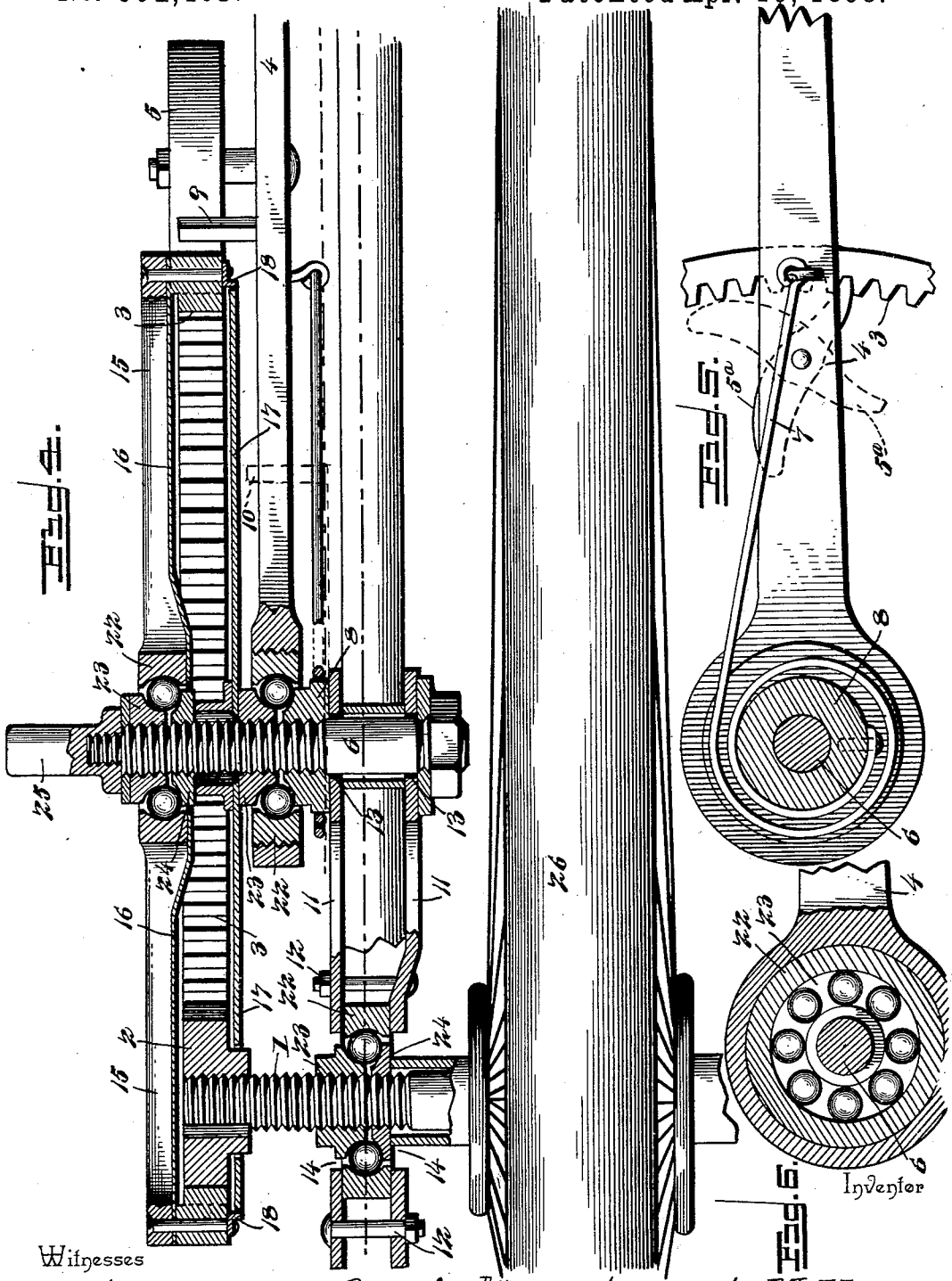

Witnesses
E. S. Stewart
V. B. Hillyard.

Inventor
By his Attorneys, George C. Mathews
C. A. Snow & Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

GEORGE C. MATHEWS, OF JACKSONVILLE, FLORIDA.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 602,461, dated April 19, 1898.

Application filed January 20, 1897. Serial No. 619,924. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. MATHEWS, a citizen of the United States, residing at Jacksonville, in the county of Duval and State of Florida, have invented a new and useful Bicycle, of which the following is a specification.

This invention relates to bicycles and like machines which are generally propelled through the intervention of a drive-chain.

The purpose of the improvement is to devise a simple propelling mechanism and one which will be effective, reduce friction, enable a variable leverage to be used at the option of the rider according to the condition of the road, combine the advantages of a brake and a stand, and avoid the use of a chain, which has been found objectionable in many respects.

One of the principal objects is the provision of a propelling-gear which can be readily applied to any of the types of machines now in use without necessitating a reconstruction of the frame.

Obviously new machines will be specially adapted to receive the invention, thereby dispensing with the plates required to attach the invention to the various forms of machines now in use.

For a full understanding of the merits and advantages of the invention reference is to be had to the accompanying drawings and the following description.

The improvement is susceptible of various changes in the form, proportion, and the minor details of construction without departing from the principle or sacrificing any of the advantages thereof, and to a full disclosure of the invention an adaptation thereof is shown in the accompanying drawings, in which—

Figure 1 is a side elevation of a bicycle having the invention applied, parts being broken away and the dotted lines representing different positions of the foot-levers. Fig. 2 is a detail view showing more clearly the relation of the parts comprising the driving-gear and the means for attaching the same to the frame of an ordinary bicycle. Fig. 3 is a detail view of a plate which is bolted or otherwise secured to the machine-frame at the juncture of the rear braces and bottom runs. Fig. 4 is a detail view, in horizontal section, of the driving-gear, showing the relation of its parts to the axle of the drive-wheel. Fig. 5 is a detail view of the inner or rear portion of a foot-lever and its resetting-spring and dog, showing a different construction and arrangement of pawl. Fig. 6 is a detail view, in vertical section, of a ball-bearing.

Corresponding and like parts are referred to in the following description and indicated in the several views of the accompanying drawings by the same reference characters.

The machine shown is of ordinary construction and illustrates the application of the invention. The axle of the rear or drive wheel is extended and threaded, as shown at 1, and a pinion 2 is made fast thereto and operates in conjunction with an internally-toothed rim 3 for imparting motion to the drive-wheel. The toothed rim 3 is intermittently actuated by means of a foot-lever 4 and a dog 5, having pivotal connection therewith, the latter automatically gripping the rim upon depressing the lever and releasing the rim when the lever is returning to a normal or starting position. The foot-lever 4 and the rim are loosely mounted upon a stud or pin 6, having its projecting end threaded to receive the complementary parts of the ball-bearings. The dog 5 is of circular form and is pivoted eccentrically to the lever 4 in such manner that it will automatically and positively grip the rim 3 when pushing down on the lever, thereby imparting movement to the rim and motion to the machine through the pinion 2, as will be readily comprehended. A spring 7 is secured at one end to a collar 8, secured upon the stud 6, and its opposite end is fastened to the lever 4 a distance from its fulcrum. The inner end of the spring 7 is coiled around the collar 8, as most clearly indicated in Fig. 5, thereby admitting of the lever being depressed at its free end, said spring serving to return the lever to a normal position when released. A stop 9 is provided on the lever and supports the dog 5 when thrown out of action, as indicated by the dotted lines in Fig. 2. A stop 10 is suitably located and limits the return movement of the foot-lever and holds it in a normal position when not pressed upon.

The pin or stud 6 is located forward of the axle 1 and is parallel therewith and will be

supported in a substantial manner, the means resorted to depending upon the style and construction of the machine. In new machines the frame will be of such construction as to provide a support for the pin; but for the various types of machines now in use plates 11 will be provided and clamped or bolted to the frame-bars at the juncture of the rear braces with the bottom runs, said plates being of approximately triangular form to correspond to the angular outline of the frame-bars to which they are secured and having the middle portion removed for the sake of lightness, as clearly indicated in Fig. 3. As shown in Fig. 2, the bolts or fastenings 12 pass through openings in the plates and are disposed to engage with the frame-bars, so as to prevent vertical displacement of the plates after the bolts are properly tightened. An opening 13 is formed in the plates to receive the pin or stud 6, and a notch 14 receives the bearing for the axle 1 and admits of the axle being readily removed for any purpose upon loosening the fastening means. A pair of plates 11 is provided for each side of the machine-frame, and a plate of each pair is disposed so that the plates come upon opposite sides of the frame-bars to which they are applied and clamped.

The toothed rim 3 is secured to spokes 15 by suitable fastenings, and a plate 16 forms the outer wall of a dust-guard and is secured between the spokes and the rim. A plate 17 is fastened to the pin or stud 6 in any convenient manner and has openings for the passage of the pin or stud and for the hub of pinion 2, and this plate 17 forms the inner wall of the dust-guard, which prevents the entrance of sand, mud, dust, or other foreign matter into the space formed between the two plates 16 and 17. An annulus 18, of L form in cross-section, is secured to the inner face of the rim 3, and its horizontal flange overlaps the edge of the plate 17 and forms a snug joint therewith, so as to exclude foreign matter.

The foot-lever 4 is provided at its end with a roller 19, which is adapted to be brought into contact with the surface of the road upon depressing the lever, thereby serving as a brake to check the speed of the machine, the pressure depending upon the force exerted by the rider. A pedal 20 is located near the free end of the foot-lever and is utilized when climbing grades or riding over rough roads, as it enables a maximum amount of leverage to be utilized in propelling the machine. A second pedal 21 is located about midway the ends of the foot-lever and is brought into service on level roads and when the riding is not heavy and can be utilized as a rest when coasting. The foot can be changed from one pedal to the other at the will of the rider, and if it be required to check the speed of the machine a pressure exerted upon the pedal 21 will lower the lever until the roller 19 is brought forcibly into contact with the surface of the road, whereby the desired end is accomplished. When the machine is not required for immediate service, the lever can be moved beyond the vertical, as indicated by the dotted lines in Fig. 1, and will act jointly with the wheels to support the bicycle in an upright position, both levers in effect forming a stand. The machine can be readily mounted without initial velocity being given thereto by placing foot on pedal 21 and depressing lever until roller 19 rests on surface of road. Then rider will mount, keeping lever still depressed to ground until ready to start by pressure on the other lever, which is at rest in normal elevated position. It is obvious that the bicycle can be stopped and started again without dismounting.

The ball-bearings for the axle, foot-lever, and power-transmitting wheel are similarly formed, each consisting of a cup 22 and cones 23 and 24, the ball-races being of greater diameter than the balls, as most clearly indicated in Fig. 4. By this construction the balls are centralized and the wear is sustained by the central portion of the ball-races, and provision is had for advancing the cones to compensate for wear and take up lost motion. The cones 23 and 24 are mounted upon the threaded portion of either the axle or the pin or stud and have a space between their inner or opposing ends to admit of the cones being brought together to secure a close joint. An extension 25 is applied to the outer end of the pin or stud 6 and provides a step or foot-rest to enable the machine to be readily mounted in the ordinary manner.

It will be understood that each side of the machine will be provided with a drive-gear similar to that described and shown, thereby enabling the levers to be alternately or simultaneously actuated as desired. When depressing the free end of a foot-lever, its dog 5 will grip the toothed rim 3 of the power-transmitting gear and turn it, and by reason of the gear or toothed rim intermeshing with the pinion 2, secured to the axle, the latter will be positively rotated and actuate the drive-wheel 26 and propel the machine, as will be readily comprehended.

The pawl 5 may be replaced by a pawl 5^a, located to act with the teeth of the rim 3, said pawl having its inner end heavy and rounding to ride upon the teeth when the lever passes beyond the perpendicular and when returning to a starting-point.

Having thus described the invention, what is claimed as new is—

1. In a drive-gear for bicycles, &c., a foot-lever bearing a pedal to receive the pressure by means of which the machine is propelled and of such relative length that when depressed a portion will be brought into contact with the surface over which the machine is advancing for the purpose of checking its speed, substantially as described.

2. In a drive-gear for bicycles, &c., a foot-lever bearing a pedal to receive the pressure,

by means of which the machine is propelled and of such relative length that when depressed its end will be brought in contact with the surface over which the machine is advancing for the purpose of checking its speed, and having a roller to receive the impact and travel upon the said surface, substantially as and for the purpose specified.

3. In a drive-gear for bicycles, &c., the combination of a pinion secured to the axle of the drive-wheel, a stud secured at a distance from the drive-wheel axle, an internally-toothed wheel mounted upon the said stud and intermeshing with the aforesaid pinion, a dust-guard secured to the outer side of the power-transmitting wheel, a dust-guard independent of the said wheel and closing its inner side and having openings for the passage therethrough of the stud and drive-wheel axle, an annulus secured to the inner side of the internally-toothed wheel and overlapping the joint formed between it and the inner dust-guard, and a lever mounted upon the aforementioned stud and having a dog to intermittently grip the power-transmitting or internally-toothed wheel, substantially as and for the purpose set forth.

4. In a drive-gear for bicycles, the combination of plates, means for clamping the plates upon opposite sides of the frame-bars at the juncture of the rear braces and bottom runs, the drive-wheel having its axle mounted in the said plates and provided with a pinion, a stud applied to the plates, an internally-toothed rim and a foot-lever mounted upon the stud, the toothed rim intermeshing with the pinion, a spring for returning the foot-lever to a normal position, a stop for limiting the return of the foot-lever, and a dog carried by the foot-lever to grip the toothed rim, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

GEORGE C. MATHEWS.

Witnesses:
C. W. FROZIER,
H. J. CASSIDEY.