No. 617,572. Patented Jan. 10, 1899.

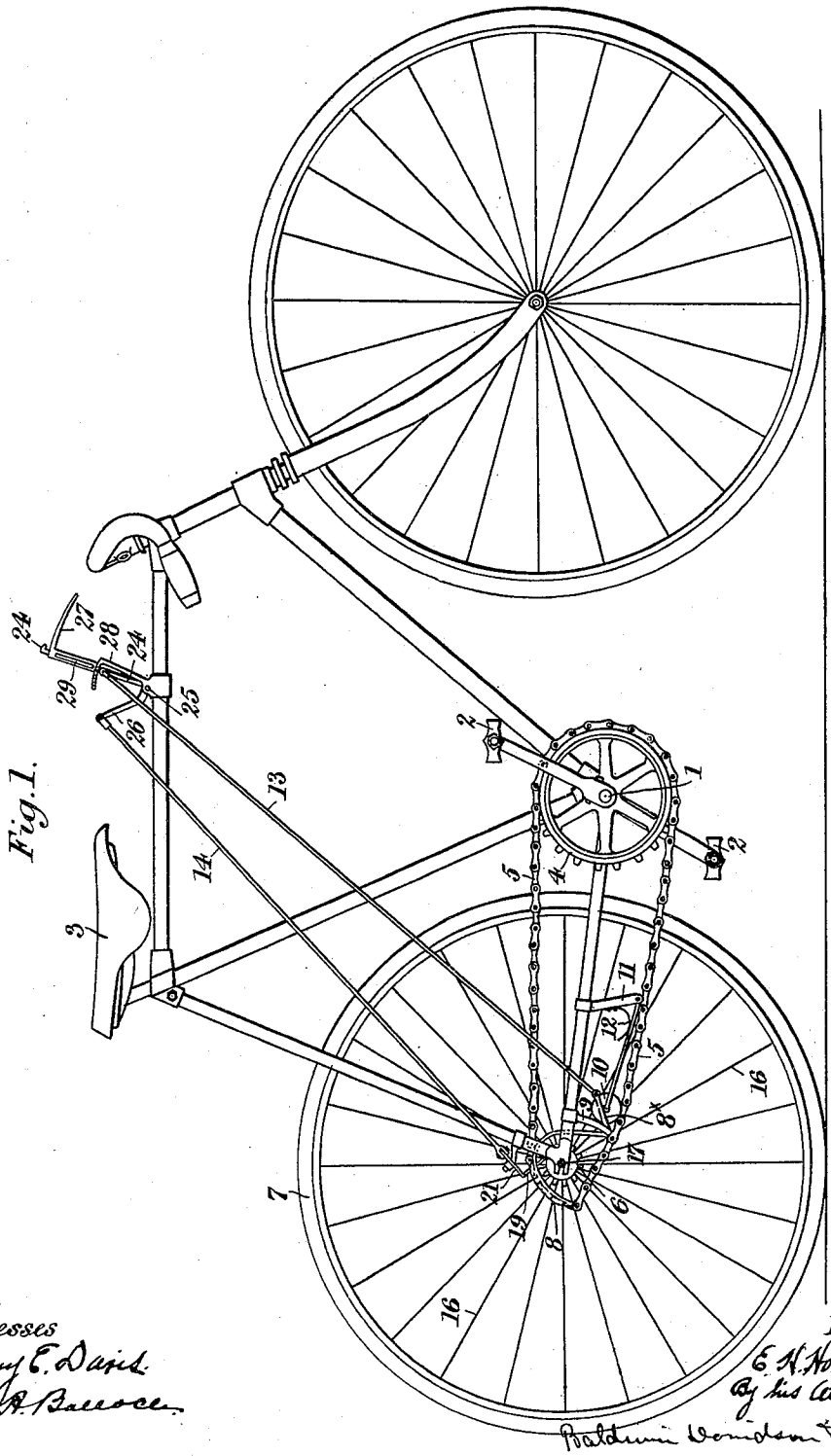
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CHANGEABLE GEARING FOR VEHICLES.

(Application filed Nov. 29, 1897.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

Fig. 2.

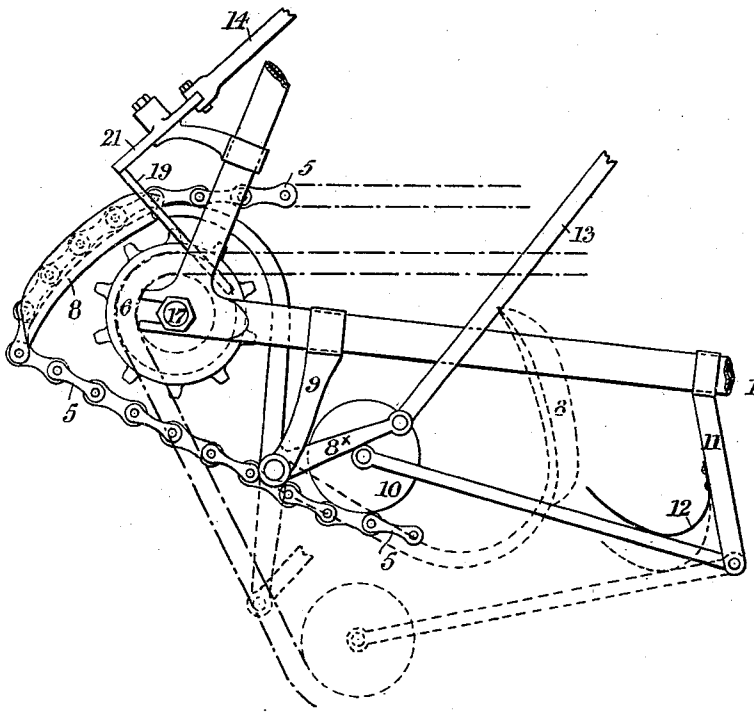


Fig. 3.

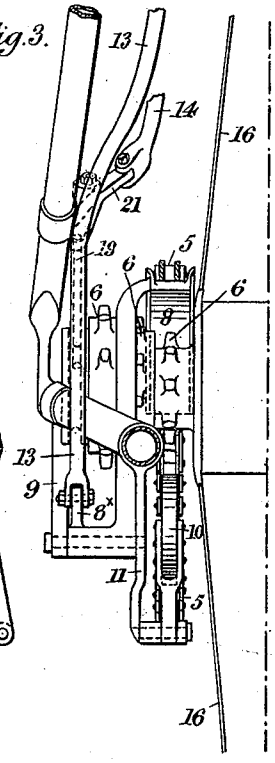


Fig. 4.

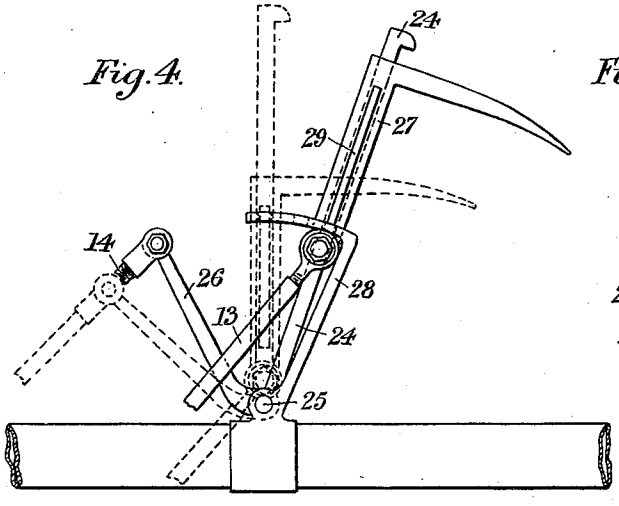


Fig. 5.

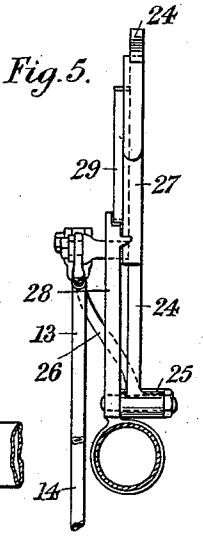
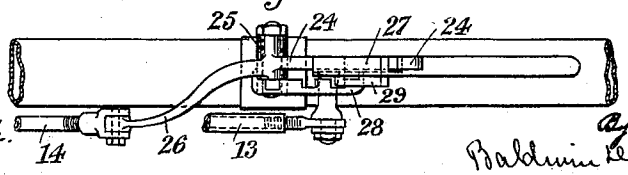


Fig. 6.



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Fig. 7.

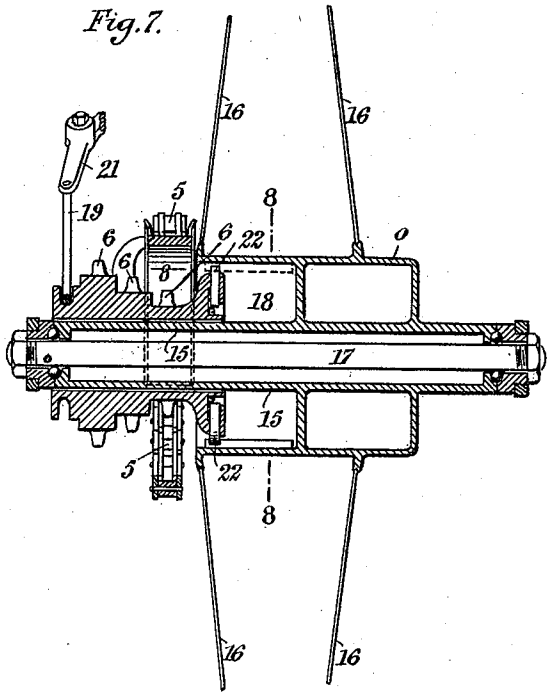


Fig. 8.

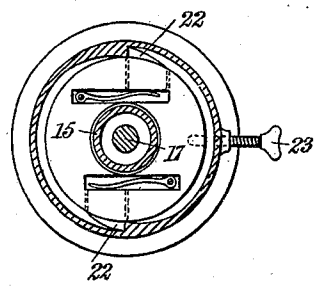
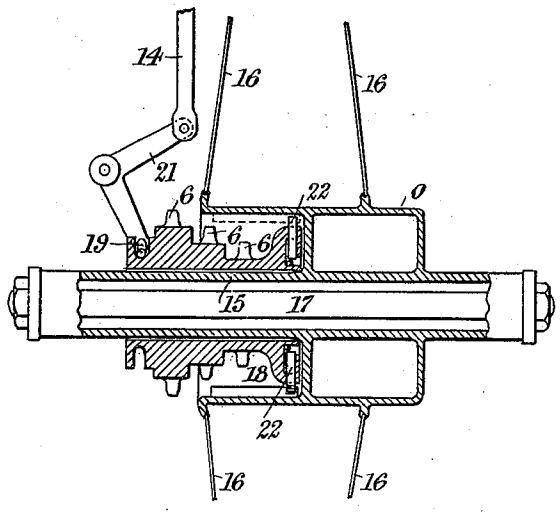


Fig. 7x.



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CHANGEABLE GEARING FOR VEHICLES.

(Application filed Nov. 29, 1897.)

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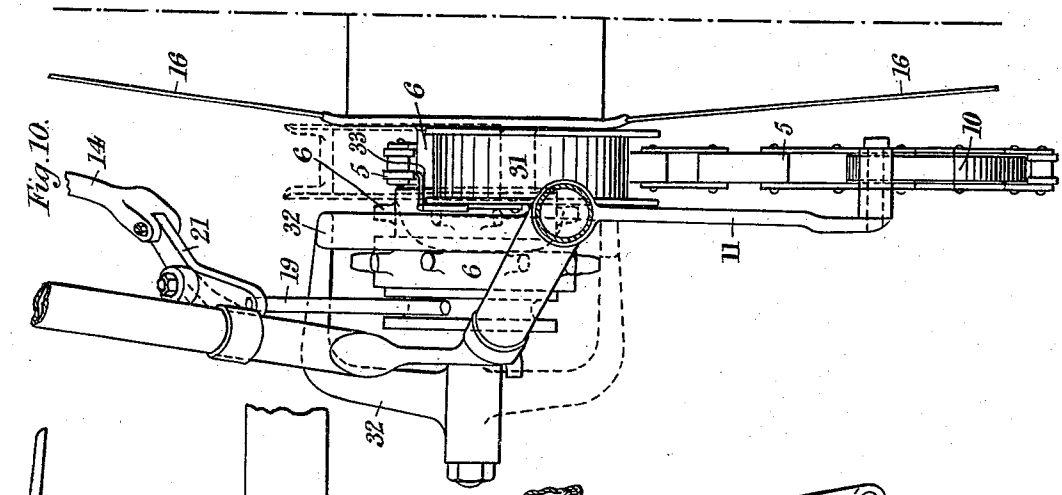


Fig. 10.

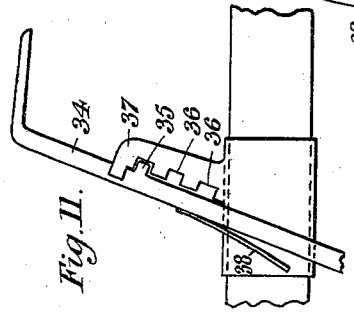


Fig. 11.

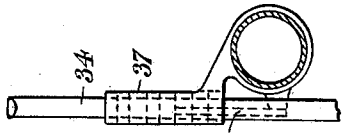


Fig. 12.

Fig. 9.

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UNITED STATES PATENT OFFICE.

EDMUND HUGH HODGKINSON, OF LONDON, ENGLAND.

CHANGEABLE GEARING FOR VEHICLES.

SPECIFICATION forming part of Letters Patent No. 617,572, dated January 10, 1899.

Application filed November 29, 1897. Serial No. 660,130. (No model.)

To all whom it may concern:

Be it known that I, EDMUND HUGH HODGKINSON, gentleman, a subject of the Queen of Great Britain, residing at 8 Lancaster Gate, London, in the county of Middlesex, England, have invented certain new and useful Improvements in Changeable Gearing for Vehicles, (for which I have received Letters Patent in Great Britain, No. 1,570, dated January 22, 1896,) of which the following is a specification.

This invention applies especially where the driving of the main wheel is effected by an endless chain encircling a toothed wheel and pinion. For the purpose of altering the speed of the gearing two or more pinions of different sizes are provided and arrangements are made for shifting the driving-chain from pinion to pinion. The pinions are set side by side rigid with each other and free to revolve on a tubular spindle which passes centrally through the hub of the wheel, of which, indeed, the spindle forms a part. The pinions can be moved along the spindle, the driving-chain having first been lifted from the pinions to put them out of gear. The hub of the main wheel is hollow and of such dimensions that the pinions which are out of use can when required be received into the hub. To lift the chain off the pinions and to replace it upon them when the position of the pinions has been adjusted, an instrument or chain-lifter is provided. The change of gear is effected by advancing the chain-lifter to the pinion, thus lifting the chain, then moving the pinions laterally along the spindle, and finally retiring the chain-lifter, leaving the chain now engaged with the pinion which it is desired to employ. It is so arranged that the change of gear can be made while riding. This may be done by the movement of a lever and of a slider thereon, or the chain-lifter may be actuated by means of the chain itself. A tooth is then provided upon the chain-lifter, which is caught when the chain is made to travel in the reverse direction. The upper part of the chain then becomes slack, and dropping onto the tooth by its own weight carries the chain-lifter into action. On again moving the chain in the forward direction the tooth escapes and a spring withdraws the chain-lifter.

Figure 1 is a side elevation of a bicycle to which my change-speed driving-gear is applied. Fig. 2 shows to a larger scale a portion of the driving-chain, the chain-lifter, and one of the pinions on the axis of the driven wheel, and some other parts. Fig. 3 shows the same parts as seen from the front. Fig. 4 is a side view of the lever and slider with handle upon it for actuating the chain-lifter and for shifting the pinions upon the spindle of the driven wheel. Fig. 5 shows the same parts as seen from the front. Fig. 6 is a plan of the same. Fig. 7 is a section through the hub of the driven wheel, looking rearward. Fig. $7^{\times}$ is another section through the hub, but in another plane. Fig. 8 is a section on the line 8 8 in Fig. 7, looking from the left-hand side of the machine. Fig. 9 is a side elevation showing a modification. Fig. 10 shows the parts indicated in Fig. 9 as seen from the front. Fig. 11 is a side view of the handle employed in connection with the parts shown in Figs. 9 and 10 for the purpose of shifting the pinions on the axis of the driven wheel. Fig. 12 shows this handle as seen from the front.

I will first describe the drawings Figs. 1 to 8. 1 is the pedal-axis, and 2 2 the pedals, driven by the rider who occupies the seat 3.

4 is the chain-wheel on the pedal-axis.

5 is the endless driving-chain.

6 6 6 are three chain-pinions on the spindle of the driven wheel 7.

8 is the chain-lifter. It is pivoted to a bracket 9 upon the frame.

10 is a jockey-roller carried by an arm which also is pivoted to a bracket 11, fixed to the frame.

12 is a spring which presses the jockey-roller downward and keeps the chain taut.

13 is a rod for actuating the chain-lifter and passing up from an arm $8^{\times}$ upon the chain-lifter to lever mechanism, which is conveniently placed in front of the rider. 14 is another similar rod passing to the same mechanism and serving to shift the pinions 6 upon the spindle of the driven wheel.

As is seen in Fig. 7, the three pinions 6 6 6

all form part of one block, and this block can slide upon the hollow spindle 15, which forms a part of the hub of the driven wheel.

o is a surface on the hub to receive a brake-strap.

16 16 are the spokes of the wheel, and 17 is the stationary axle on which the wheel revolves, ball-bearings being provided, as the drawings indicate.

18 is a chamber or recess in the hub of the wheel into which the pinion-block can be caused to enter more or less to bring either pinion 6 6 6 to range with the driving-chain 5 and ready to be engaged by it.

19 is a finger which enters an annular groove on the pinion-block. This finger is carried by a rocking lever 21, to which at its other end the rod 14 is jointed. The pinion-block also carries two spring-catches 22, which enter corresponding recesses in the hub of the wheel. These parts are so formed that when the pinion-block turns in a forward direction it carries the driven wheel around with it, but when the pinions are at rest or turning in a backward direction the wheel is still able to run forward. The pinion-block can, however, when desired, be locked fast with the hub of the wheel by inserting a locking-screw 23, as seen in Fig. 8.

24 is the lever for shifting the pinions. It has its fulcrum on the frame at 25. It also has an arm 26, and to this arm the rod 14 is jointed.

27 is the slider upon the lever. The rod 13 is jointed to its lower end.

28 is a guide fixed to the frame. It has notches upon it with which a rib 29 on the slider can engage. Dotted lines in Fig. 4 show the slider in its lower position and engaged with the rearward notch in the guide. This would be the position of the parts when the chain is upon the smallest of the three pinion 6 6 6—that is to say, when the fastest speed of gear is in use. To shift the gear to another speed, the slider is first drawn up the lever until the rib 29 is free from the notch in the stationary guide. During this movement the chain-lifter operates. Then the lever is thrust forward and the rib 29 is brought to correspond with another of the notches in the guide. This shifts the pinions 6 6 6 and brings that one under the chain which is to be next used. Finally the slider is thrust down again, which throws the chain-lifter out of use and places the chain upon the pinion. The parts are now locked fast, the rib 29 being in a notch of the guide. The chain-lifter 31 (shown in Figs. 9 and 10) is somewhat differently arranged. It is carried by an arm 32, which is able to turn about the axis of the driven wheel. As shown in full lines, it is in the position it occupies when out of use and by dotted lines in the position it assumes when it comes into operation. The driving-chain also is shown in two positions, as also is the dotted roller, which presses upon the chain.

33 is a spring-tooth upon the chain-lifter. The chain when driving the wheel passes the tooth 33 freely; but when the rider commences to back-pedal, while the wheels continue to run forward, the tooth engages with the chain and the chain-lifter makes a semi-rotation about the axis it reaches a stop, against which it comes to rest. The chain being now disengaged from the pinions 6 6 6, these are then placed, as required, by means of the finger 19, and the chain-lifter comes back to a stop in its original position when the rider works the pedals in a forward direction.

The handle 34 (shown in Figs. 11 and 12) is simply a prolongation of the rod 14. It has a tooth 35 upon it which can be lodged in either one of the three notches 36 in the guide 37, which is fixed upon the frame of the vehicle. A spring 38 holds the tooth engaged with the notch; but the rider can shift the handle freely by drawing it back against the resistance of the spring, and then after moving it up or down placing it in another notch, as the case may require.

When in this specification I refer to "driving-chains," "chain-lifters," "chain-pinions," &c., I intend to include driving belts and bands and lifters and pulleys adapted to work with belts and bands.

What I claim is—

1. The combination of an endless driven chain, chain-pinions of different sizes over one or other of which the chain extends, a chain-lifter, means for shifting the chain-lifter, and means for shifting the pinions.

2. The combination of an endless driven chain, chain-pinions, mechanism for shifting the pinions, a chain-lifter, means for operating it, and a tooth upon the chain-lifter adapted to be engaged by the driving-chain.

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