No. 698,132. Patented Apr. 22, 1902.

W. H. PALMER.

TWO SPEED DRIVING GEAR FOR BICYCLES.

(Application filed May 7, 1900.)

(No Model.) 2 Sheets—Sheet 1.

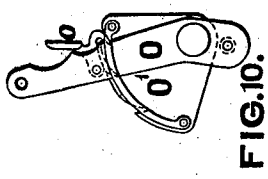


FIG.10.

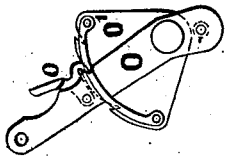


FIG.9.

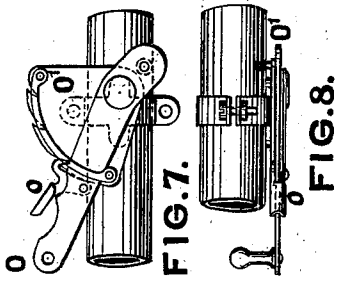


FIG.7. FIG.8.

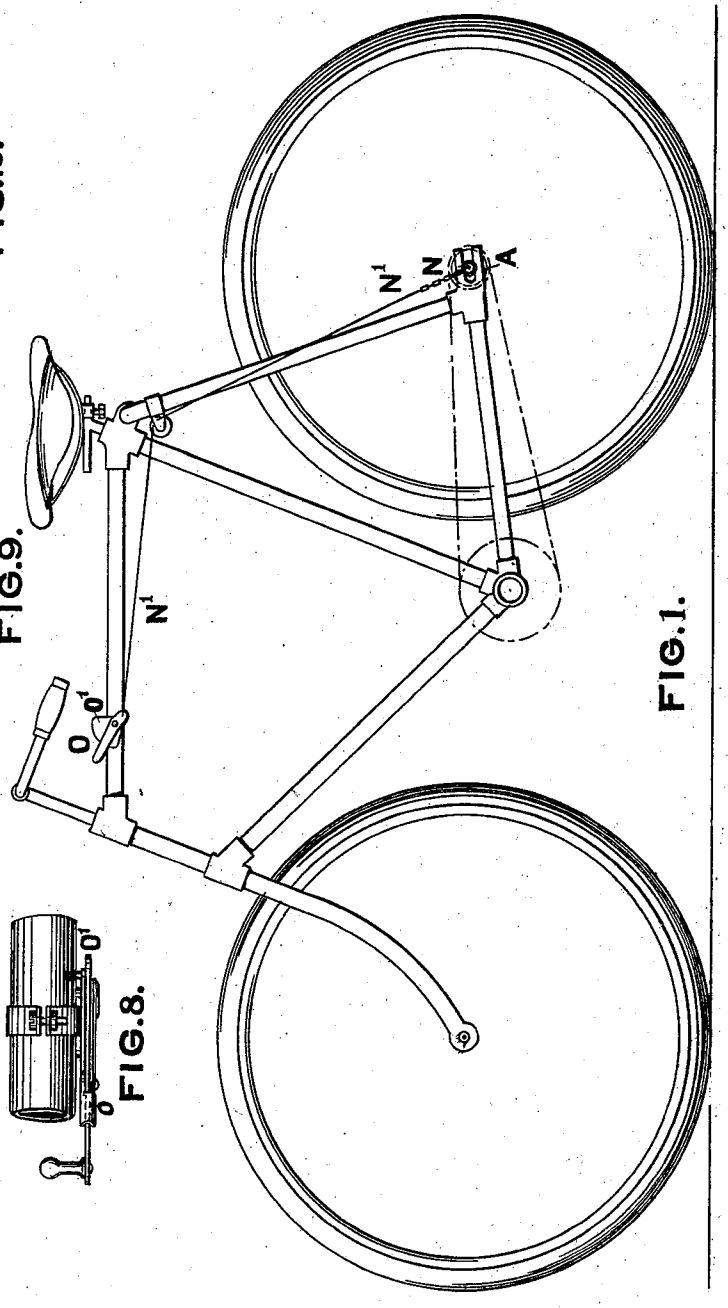


FIG.1.

WITNESSES.
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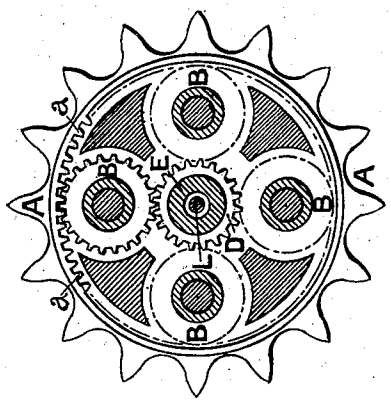


FIG. 5.

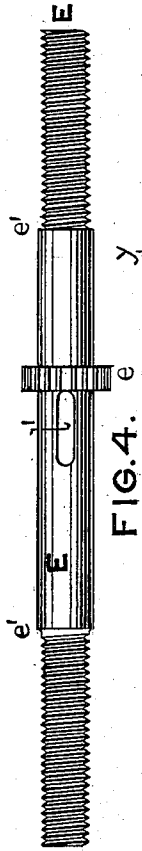


FIG. 4.

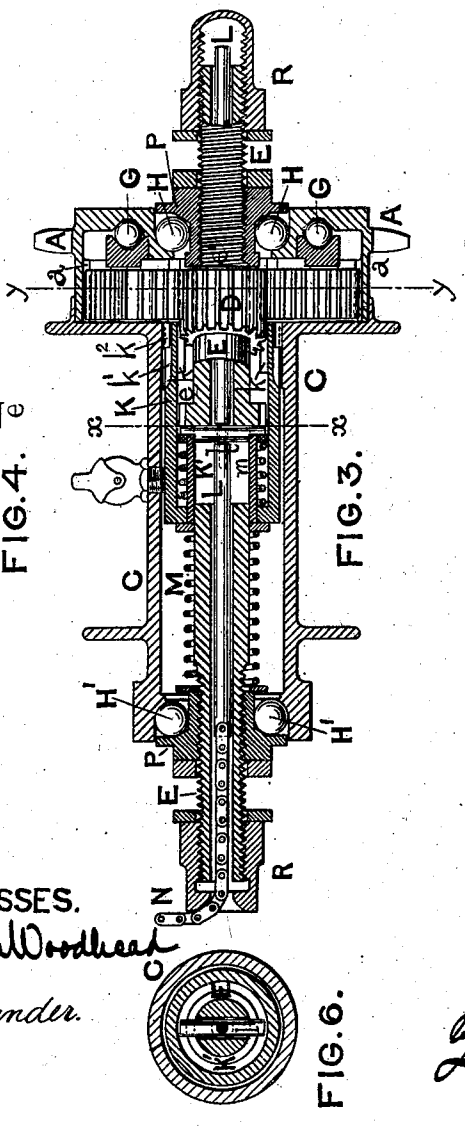


FIG. 3.

FIG. 6.

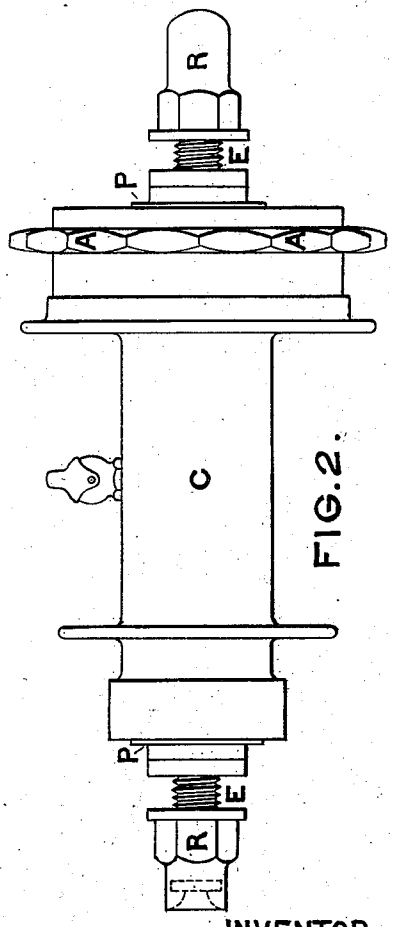


FIG. 2.

WITNESSES.

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UNITED STATES PATENT OFFICE.

WILLIAM HENRY PALMER, OF MIDDLETON, ENGLAND.

TWO-SPEED DRIVING-GEAR FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 698,132, dated April 22, 1902.

Application filed May 7, 1900. Serial No. 15,781. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY PALMER, engineer, a British subject, and a resident of Middleton, in the county of Lancaster, England, have invented certain new and useful Improvements in Two-Speed Driving-Gear for Bicycles, of which the following is a specification.

This invention relates to improvements in the two-speed driving-gear for bicycles described in the specification of Reilly and Haigh's patent, No. 588,657, dated the 24th of August, 1897, parts of which may also be applied to free-wheel gear. We now construct the apparatus so that the sliding clutch or sleeve by which the gear is altered may be drawn back by a chain or flexible band instead of by a lever or screw, as formerly, and we also provide that the central pinion cannot be jammed by the cone or nut on the spindle end.

The improvements will be fully described with reference to the accompanying drawings.

Figure 1 is a side elevation of bicycle, showing the invention applied thereto; Fig. 2, an elevation of hub of driving-wheel; Fig. 3, a longitudinal section of same; Fig. 4, a side elevation of spindle; Fig. 5, a transverse section on line $y\ y$, Fig. 3; Fig. 6, a transverse section on line $x\ x$, Fig. 3; Fig. 7, a side elevation of lever, cross-section, in one position; Fig. 8, a plan of Fig. 7; Fig. 9, a side elevation of same in another position; Fig. 10, a side elevation of same in a third position.

The gearing is constructed as described in the specification of the previous patent, No. 588,657, dated August 24, 1897, with a sprocket driving-wheel A, with internal teeth a, the intermediary driving-pinions B, and the central rotating pinion D; also, the hub C, with internal teeth k^2, and the sliding sleeve K, with teeth k to engage with the central pinion D, and teeth k' to engage with the internal teeth k^2 on the hub. The sleeve K slides to and fro on the central spindle E over the teeth e, the internal teeth k' engaging therewith. The sleeve K is forced or moved in one direction and held in its normal position by the spring M. A second or inner sleeve K′ is placed inside the sleeve K, with a buffer-spring m, to make an elastic attachment between the operating-rod L and the movable sleeve K. The central spindle E is made hollow or tubular, preferably from end to end, and is internally provided with an operating-rod L sliding therein and fitted with a cross-head l. The cross-bar l projects through slits l' in the spindle E and the ends engage the inner sleeve K. The operating-rod L has at one end attached to it a chain N, which extends out through the end of the hollow spindle E. By this chain the rod L is drawn back against the pressure of the spring M, placed on the exterior of the spindle E. Instead of a chain a flexible wire rope or band may be employed; but a chain is preferred to make the attachment within the interior of the spindle, with a flexible wire rope N′ extending from the chain to the operating-lever O, as shown in Fig. 1.

The spindle E is made in two diameters, (see Fig. 1,) the central part thicker than the ends, forming shoulders e', against which the cones P can abut. The ends are screwed externally, and the cones P are screwed internally to correspond. The cones when in position can be screwed against the shoulders e', thereby preventing the cone P at the gear end of the hub being tightly screwed against the central pinion D, this pinion being of such a length as not to project beyond the shoulder.

Upon the screwed end of the spindle E, through which the chain or flexible band N passes, is fitted a nut R, with a bell or trumpet shaped mouth, curved, rounded, or otherwise beveled, which projects over the screwed end of the spindle. This construction of nut provides a bearing-surface over which the chain or flexible band N can slide or move with but little friction when pulled at an angle at right angles to the axis of the spindle. On the other end of the spindle E a nut R in the form of a cap is fitted.

A precisely similar arrangement of chain or flexible band and nut and sliding sleeve or clutch may be employed for a free-wheel movement without the epicyclic train of wheels forming the two-speed mechanism.

The flexible chain N is connected to the flexible wire rope N′, and the rope N′ is attached to an operating-lever O, fitted to top bar or other convenient part of the cycle-

frame. The lever O is provided with a sector O′ and catch *o*, by which it is held in the desired position. (See Figs. 7 to 10.)

G, H, and H′ are the balls for the ball-bearings.

What I claim as my invention, and desire to protect by Letters Patent, is—

1. In a two-speed driving-gear for cycles an inner sleeve K′ placed inside the sliding toothed sleeve K to act as a buffer against the cross-bar *l* and a buffer-spring *m* placed thereon in combination with the hollow sliding sleeve K, the inner pinion D, the hub *c*, pinions B, sprocket-wheel A, hollow spindle E, operating-rod L and cross-bar *l* inside the spindle, the spring M in the spindle, the chain N attached to the rod L, the retaining-nut R with rounded edges on the end of the spindle to permit of the free movement of the chain N substantially as described.

2. In a two-speed driving-gear for cycles, an inner sleeve K′ placed inside the sliding toothed sleeve K to act as a buffer against the cross-bar *l*, a buffer-spring *m* placed thereon and a retaining-nut R with rounded edges placed over the end of the spindle to permit of the free movement of the chain N therein in combination with the hollow sliding sleeve K, the inner pinion D, the hub *c*, pinions B, sprocket-wheel A, hollow spindle E, operating-rod L, and cross-bar *l* inside the spindle, the spring M on the spindle, the chain N attached to the rod L, the flexible band N′ connected to the chain, the operating-lever O attached to the frame, the sector O′ and the catch *o* to retain the lever in position substantially as described.

In witness whereof I have hereunto signed my name, in the presence of two subscribing witnesses, this 23d day of April, 1900.

WILLIAM HENRY PALMER.

Witnesses:

J. OWDEN O'BRIEN,

B. TATHAM WOODHEAD.