(No Model.) 3 Sheets—Sheet 1.

V. BÉLANGER.

CHANGE GEARING FOR BICYCLES.

No. 590,126. Patented Sept. 14, 1897.

FIG. 1.

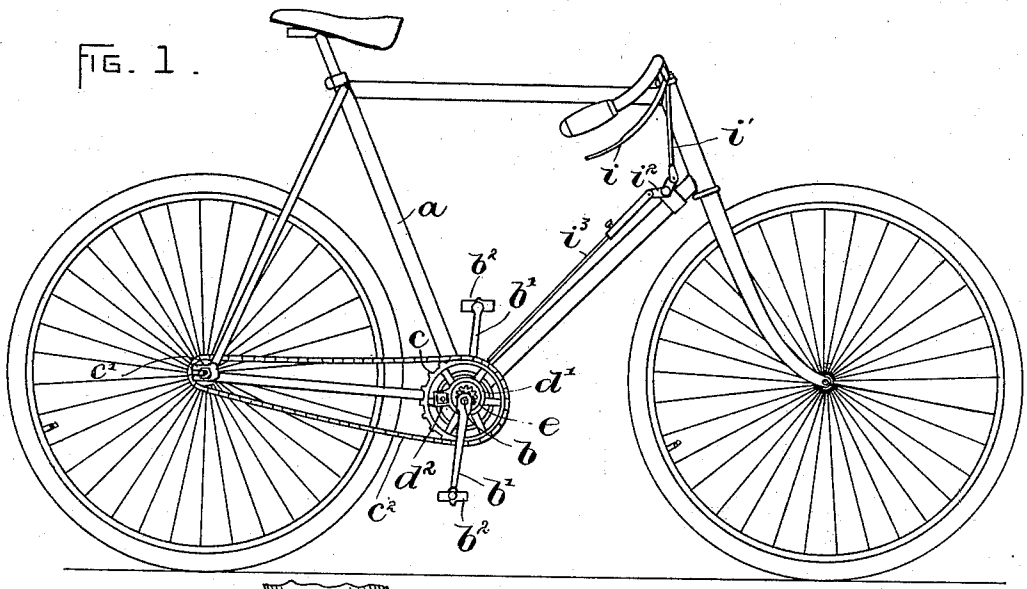
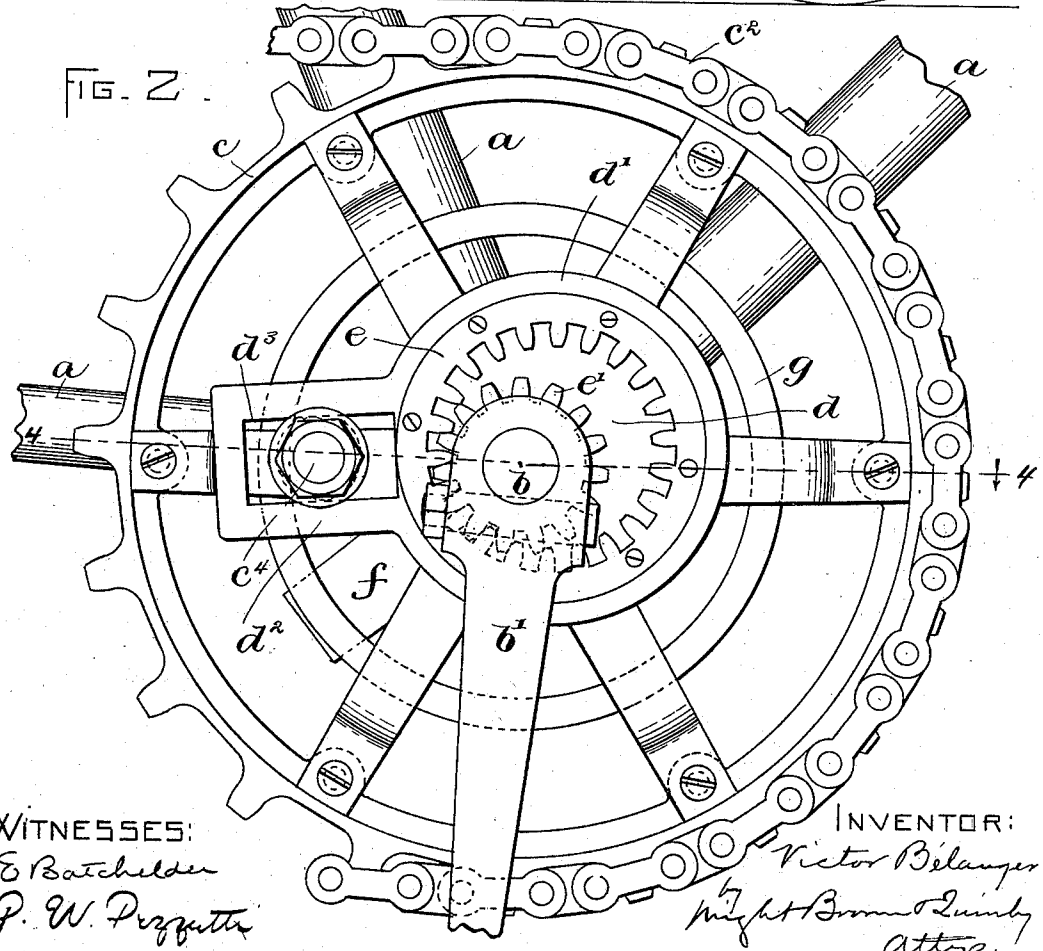


FIG. 2.



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FIG. 3

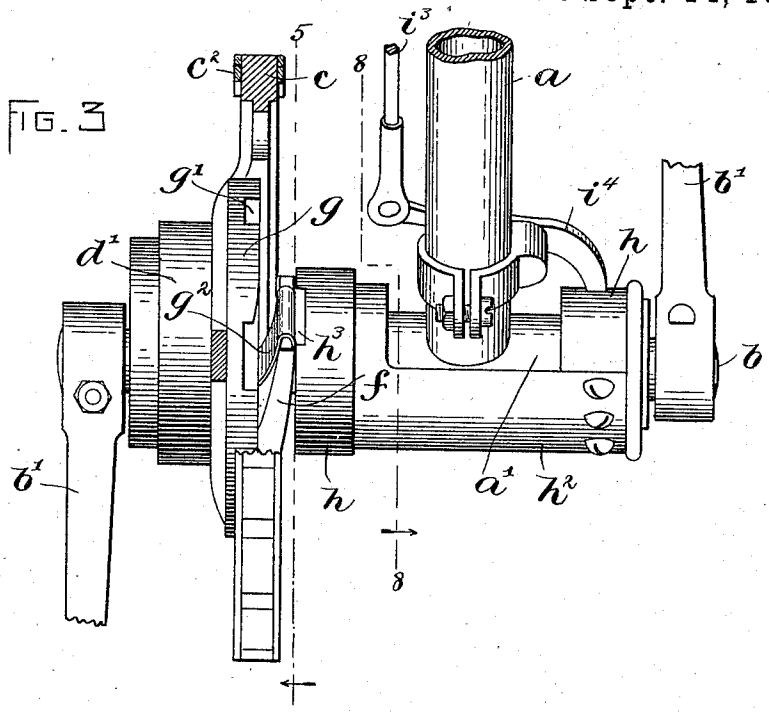
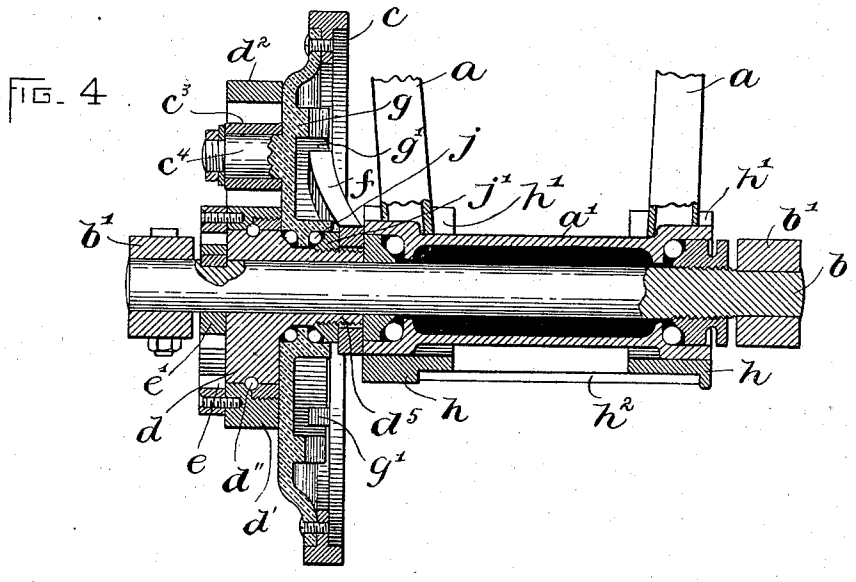


FIG. 4



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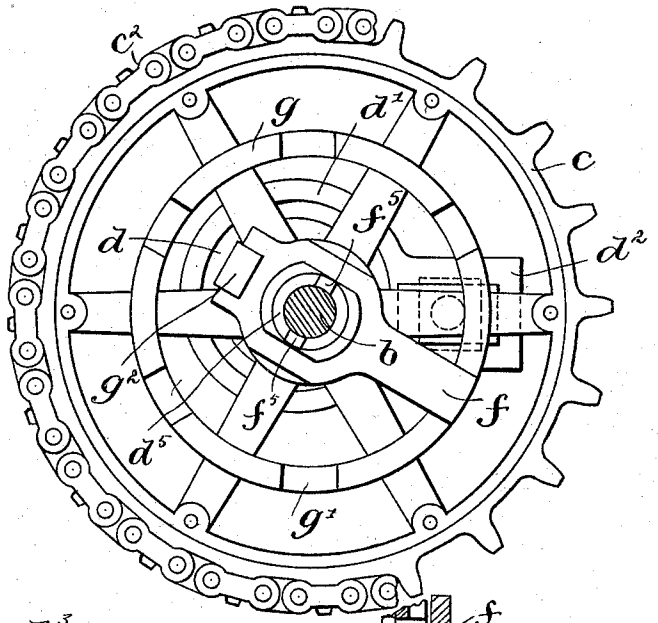
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V. BÉLANGER.

CHANGE GEARING FOR BICYCLES.

No. 590,126. Patented Sept. 14, 1897.

FIG. 5



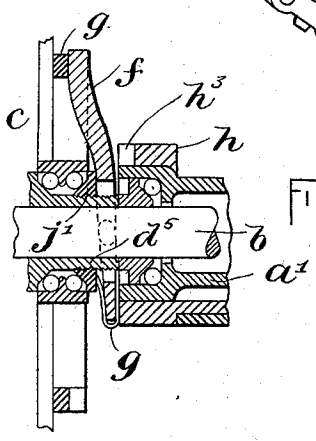


FIG. 6.

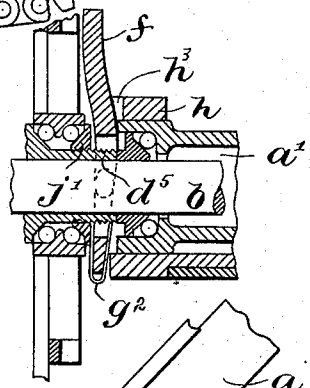


FIG. 7.

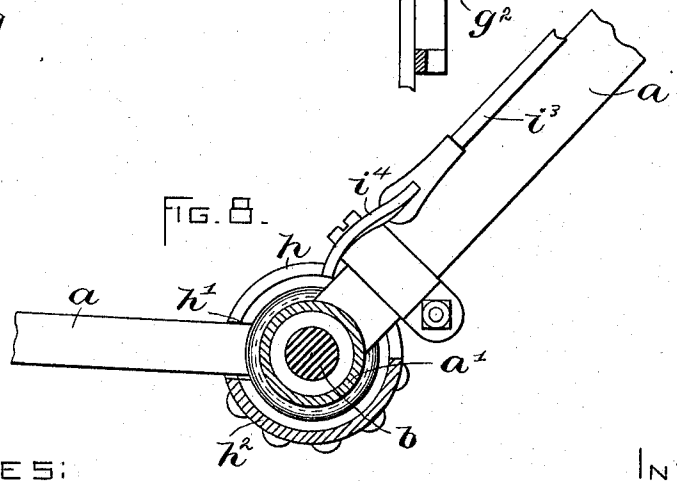


FIG. 8.

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

UNITED STATES PATENT OFFICE.

VICTOR BÉLANGER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO WILLIAM D. HUNT, OF SAME PLACE.

CHANGE-GEARING FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 590,126, dated September 14, 1897.

Application filed September 21, 1896. Serial No. 606,532. (No model.) Patented in England April 18, 1895, No. 7,808.

To all whom it may concern:

Be it known that I, VICTOR BÉLANGER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Change-Gearing for Bicycles, (patented in England, No. 7,808, dated April 18, 1895,) of which the following is a specification.

The object of the present invention is to provide a practical arrangement for changing the gearing in a bicycle, so as to obtain increased power or speed, according to requirements or the desire of the rider, and that without the necessity of the rider dismounting.

Simplicity and compactness of structure and strength and durability of parts are desiderata which have been kept in view in devising my improvements.

An embodiment of the invention is illustrated in the accompanying drawings, which form part of this specification.

Of the drawings, Figure 1 shows a side elevation of a bicycle of the modern safety type to which my improvements are applied. Fig. 2 shows the improvements in elevation on an enlarged scale as viewed from the other side. Fig. 3 shows a front elevation of the same on a somewhat smaller scale than Fig. 2 and with a portion of the sprocket-wheel broken away and in section. Fig. 4 shows a longitudinal horizontal section taken on line 4 4 of Fig. 2. Fig. 5 shows a section on line 5 5 of Fig. 3, looking in the direction of the arrow crossing said line. Figs. 6 and 7 show detail sectional views illustrative of the operation of a clutch device hereinafter described. Fig. 8 shows a section on line 8 8 of Fig. 3, looking in the direction of the arrow crossing said line.

The letter a designates the frame of the bicycle, which may be of any suitable form and supports a transverse bearing a' for a shaft b, to whose ends are affixed crank-arms b', carrying pedals b^2.

The letter c designates a sprocket-wheel mounted on the said shaft b, and c' a smaller sprocket-wheel on the hub of the rear ground-wheel and connected with the sprocket-wheel c by a chain c^2. This general arrangement is the same as commonly employed in the class of machines known as "safety-bicycles." In accordance with my invention, however, the sprocket-wheel c is not affixed to the shaft b, as ordinarily, but is independently rotatable respecting the same, and provision is made whereby said sprocket-wheel may be caused to rotate as though affixed to the shaft or through intermediate gearing, according as speed or power is wanted.

The construction is as follows: A circular block d is mounted eccentrically on the shaft b, but is not affixed thereto, the design being to hold this eccentric stationary while the lower-gear adjustment obtains, the shaft then revolving in it, whereas when the high gear obtains said eccentric turns with the shaft. A band d' embraces the eccentric, ball-bearings d'' being interposed, and carries an internal gear e beyond the outer face of the eccentric, and a pinion e' is affixed to the shaft b and meshes with said internal gear. The band d' is formed with a radial arm d^2, slotted longitudinally, as at d^3, to receive a roller c^3 on a pin c^4, projecting from one of the spokes of the sprocket-wheel c. The engagement of the roller-equipped pin and the slotted arm maintains rotative connection of the internal gear and the sprocket-wheel, while at the same time permitting relative radial movement required by the eccentricity of the gear to the wheel.

The eccentric has an elongated hub d^5, and the sprocket-wheel is mounted in this hub with interposed ball-bearings j, as shown. There is sufficient space between the adjusting-cone j' of the ball-bearings and the end of the crank-shaft bearing to receive a clutch device and permit the required movement of the same. This clutch device is in the form of a bar f, which straddles the hub d^5, as shown in Fig. 5, and is provided with pivot-pins f^5, journaled in notches in the end of said hub. There is a ring or annular flange g formed on or attached to the sprocket-wheel on its inner side and provided with a series of notches g', formed to receive one arm of the clutch-bar f when the eccentric and the wheel are to be rotatively connected. A spring g^2 tends to create such engagement, said spring being fastened to the arm of the clutch-bar on the side of its pivot opposite that engaging the notched flange of the wheel and bearing against the adjusting-cone j'.

The clutch-bar is disengaged from the wheel by means of a sleeve which slides longitudinally on the crank-shaft bearing a' and is composed of heads h, fitted to said bearing and slotted at h' to embrace portions of the frame a, and a partly-tubular connecting-shell h^2. By the engagement of the heads h with the frame the sleeve is held from rotation. Said sleeve is designed to act against the short arm of the clutch-bar and thereby disengage its long arm from the sprocket-wheel, and the head h is formed with a notch h^3 to receive the long arm of the clutch-bar.

When the clutch-bar is in engagement with the sprocket-wheel, it will be seen that power applied to the pedals is transmitted directly from the crank-shaft to the sprocket-wheel and the intervening gears are dormant, for the internal gear cannot rotate on the eccentric while the latter is locked to the sprocket-wheel. This may be considered the normal condition and while it obtains it is as though the machine were of the ordinary construction and the effect in propulsion is the same. When it is desired to obtain more power and less speed, the sleeve h h^2 is operated to disengage the clutch-bar from the sprocket-wheel and engage it with the sleeve. The eccentric is now prevented from rotating and rotation of the crank-shaft causes the pinion affixed thereto to rotate the internal gear on the eccentric and motion is transmitted to the sprocket-wheel through the slotted arm of the internal gear and the roller-equipped pin on the wheel. Now the crank-shaft and sprocket-wheel do not rotate turn for turn, but motion is transmitted from the small gear on the shaft to the large gear on the wheel and power is thereby derived, the wheel turning less rapidly than the shaft.

The shifting-sleeve is controlled from the handle-bar through the following connections: A lever i is pivoted to the under side of the handle-bar and is connected with a pendent rod i', which is jointed to a bell-crank lever i^2, supported by a bearing on a convenient portion of the frame. A rod i^3, jointed to the other arm of said bell-crank lever, is connected at its lower end with a bent lever i^4, pivoted to a bearing on the frame and engaging a socket in one of the heads h of the sleeve.

It is evident that the invention is capable of being embodied in different forms than that here shown and is not, therefore, limited in this respect.

What I claim as my invention is as follows:

1. In change-gearing, the combination of a driving-pinion, an internal gear in mesh therewith, a support for said internal gear loosely mounted concentrically with the said driving-pinion and holding the internal gear eccentric thereto, a driven wheel concentric with the driving-pinion, permanently interlocked parts rotatively connecting the internal gear and the driven wheel with provisions for relative radial movement, and means for holding the internal-gear support stationary.

2. The combination of a shaft carrying a pinion affixed to it, an eccentric on the shaft, an internal gear mounted on the eccentric and meshing with the pinion, a wheel concentric with the shaft and independently rotatable respecting the same, the said internal gear and the said wheel having permanently interlocked parts rotatively connecting them, with provisions for relative radial movement, and a clutch device for holding the eccentric stationary, leaving the internal gear free to rotate upon it or establishing rotative connection between the eccentric and the wheel.

3. The combination of a shaft carrying a pinion affixed to it, an eccentric on the shaft, an internal gear mounted on the eccentric and meshing with the pinion and having a radial slotted arm, a wheel concentric with the shaft and independently rotatable respecting the same, said wheel having a roller-equipped pin engaging the slotted arm of the internal gear, and a clutch device for holding the eccentric stationary, leaving the internal gear free to rotate upon it, or establishing rotative connection between the eccentric and the wheel.

4. The combination of a shaft carrying a pinion affixed to it, an eccentric on the shaft, an internal gear mounted on the eccentric and meshing with the pinion, a wheel concentric with the shaft and independently rotatable respecting the same, the said internal gear and the said wheel having interlocking parts rotatively connecting them with provisions for relative radial movement, and a clutch-bar rotatively and pivotally connected with the eccentric and adapted to be interlocked with the wheel or with a fixture to permit or prevent rotation of the eccentric.

5. The combination of a shaft carrying a pinion affixed to it, an eccentric on the shaft, an internal gear mounted on the eccentric and meshing with the pinion, a wheel concentric with the shaft and independently rotatable respecting the same, the said internal gear and the said wheel having interlocking parts rotatively connecting them with provisions for relative radial movement, a clutch-bar carried by the eccentric in rotative engagement therewith and movable thereon to rotatively engage it with and disengage it from the wheel, and a sliding non-rotatable sleeve arranged to abut said clutch-bar under one direction of movement and disengage it from the wheel, said sleeve being constructed to interlock with the clutch-bar, for the purpose described.

6. In a bicycle, the combination of a crank-shaft carrying a driving-pinion affixed to it, an eccentric on the shaft, an internal gear on the eccentric and meshing with the pinion, a wheel concentric with the shaft and independently rotatable respecting the same, the said internal gear and the said wheel having interlocking parts rotatively connecting them

with provisions for relative radial movement, and the wheel having an annular notched flange, a clutch-bar pivoted to the eccentric and rotatable therewith, said bar extending on both sides of the pivot and one of its arms being constructed for engagement associated with the other arm of said clutch-bar to impel the first-named arm into engagement with the wheel, and a sleeve on the shaft-bearing and engaged with the machine-frame to prevent its rotation, said sleeve being longitudinally movable to act against the spring-equipped arm of the clutch-bar and disengage its other arm from the wheel and being provided with a notch for engagement with said bar.

7. In a bicycle, the combination of a crank-shaft carrying a driving-pinion affixed to it, an eccentric on the shaft, an internal gear on the eccentric and meshing with the pinion, a wheel concentric with the shaft and independently rotatable respecting the same, the said internal gear and the said wheel having interlocking parts rotatively connecting them with provisions for relative radial movement, and the wheel having an annular notched flange, a clutch-bar pivoted to the eccentric and rotatable therewith, said bar extending on both sides of the pivot and one of its arms being constructed for engagement with the notches in the annular flange of the wheel, a spring impelling said arm into such engagement, a sleeve on the shaft-bearing and engaged with the machine-frame to prevent its rotation, said sleeve being longitudinally movable to act against the clutch-bar and disengage it from the wheel and being provided with a notch for engagement with said bar, and connections from the handle-bar for operating said sleeve.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 29th day of July, A. D. 1896.

VICTOR BÉLANGER.

Witnesses:
E. BATCHELDER,
P. W. PEZZETTI.