No. 674,218. Patented May 14, 1901.

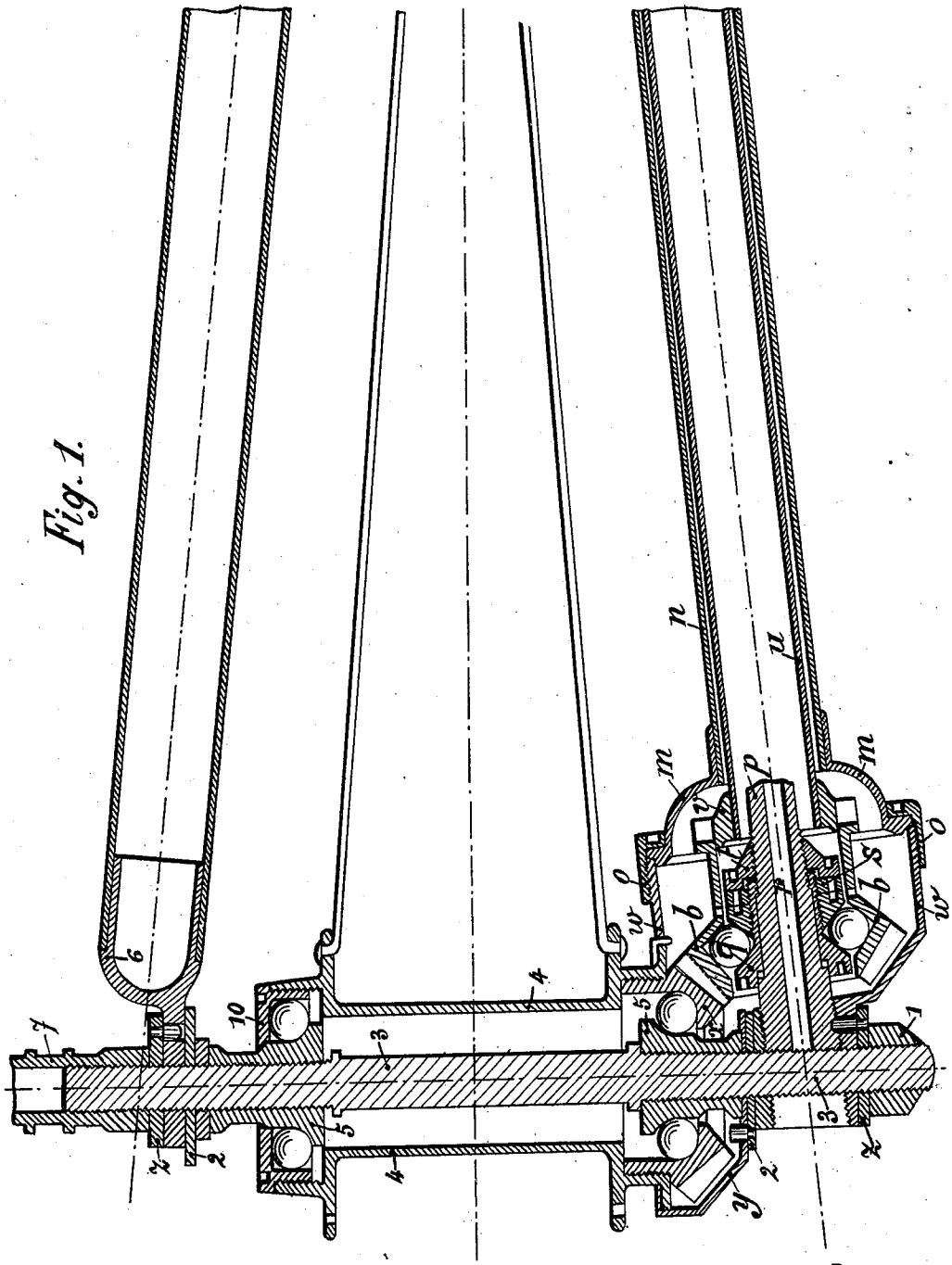
# O. ROBERT.

## DRIVING GEAR.

(Application filed Aug. 14, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.




Witnesses:

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John Lotka

Inventor:

Octave Robert

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No. 674,218. Patented May 14, 1901.

# O. ROBERT.

## DRIVING GEAR.

(Application filed Aug. 14, 1899.)

(No Model.) 3 Sheets—Sheet 2.

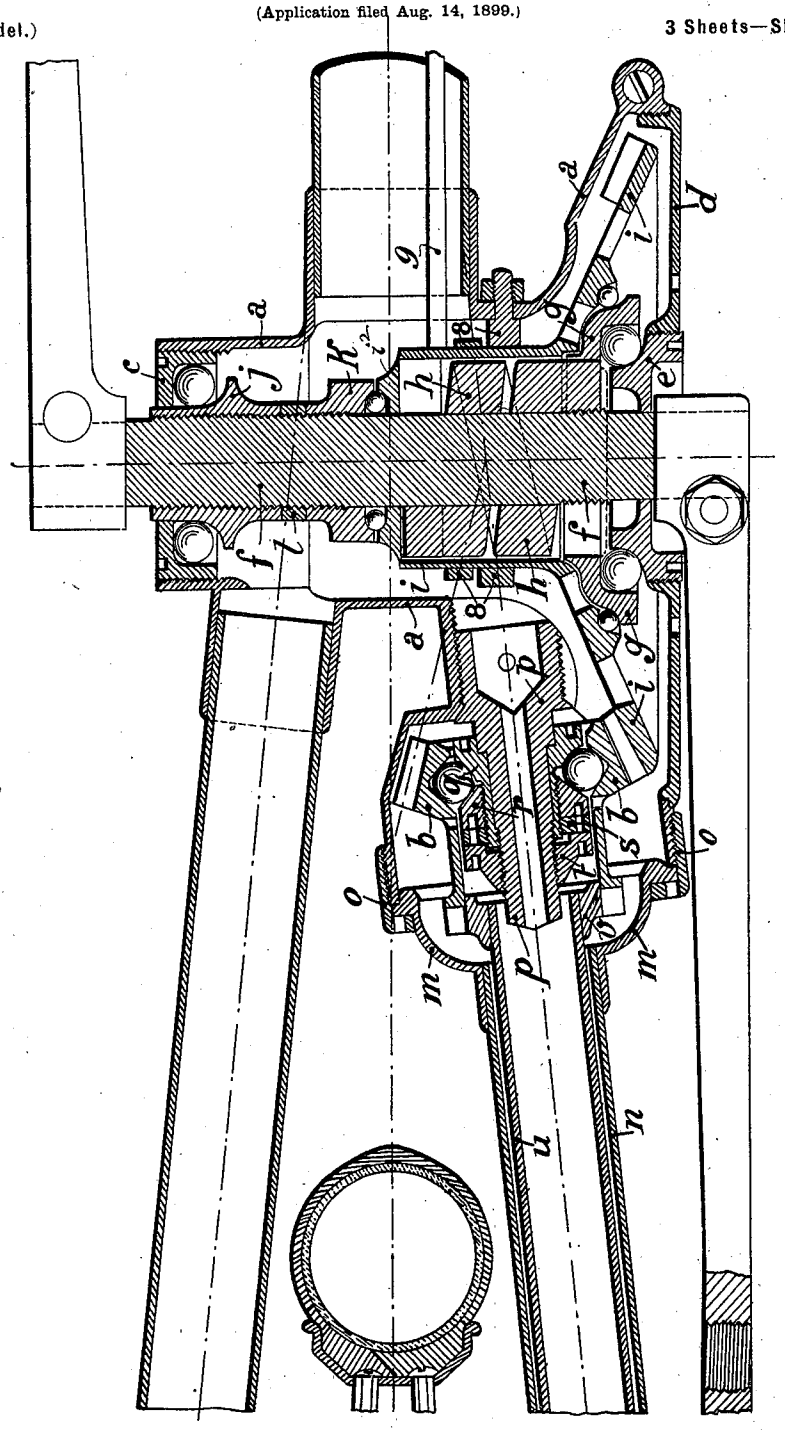


Fig. 2.

Witnesses:
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O. ROBERT.

DRIVING GEAR.

(Application filed Aug. 14, 1899.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 5.

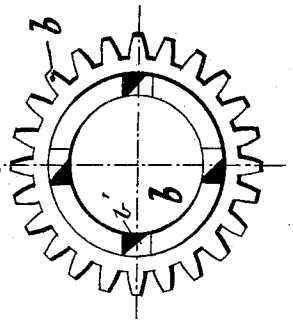



Fig. 4.

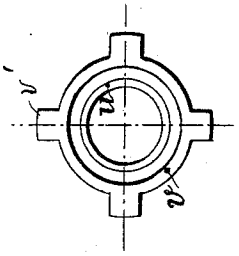
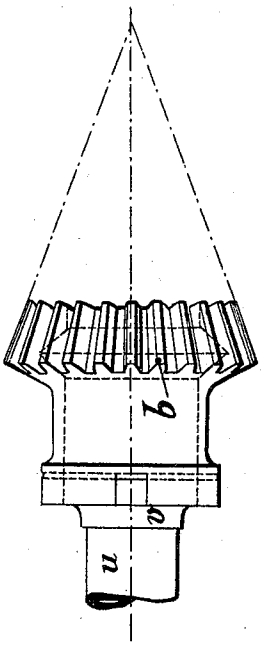



Fig. 3.




Witnesses:

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John Lotka

Inventor:

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# UNITED STATES PATENT OFFICE.

OCTAVE ROBERT, OF PARIS, FRANCE.

## DRIVING-GEAR.

SPECIFICATION forming part of Letters Patent No. 674,218, dated May 14, 1901.

Application filed August 14, 1899. Serial No. 727,174. (No model.)

*To all whom it may concern:*

Be it known that I, OCTAVE ROBERT, a citizen of the French Republic, and a resident of Paris, France, have invented certain new and useful Improvements in Driving-Gears, of which the following is a full, clear, and exact specification.

My invention relates to improvements in the gearing mechanism of chainless bicycles, motocycles, and automobiles. Its objects are, first, to permit the construction of a machine with an elastic gearing mechanism whose different parts being simple and independent from each other may be easily exchanged and replaced; second, to do away in the said mechanism with screws, nuts, and bolts in order to avoid the running loose of its parts, and, third, to base the gearing mechanism on a principle which permits the different parts to be easily manufactured, the gearing of the pinions to remain always in a perfect state, and, the transmission-shaft being uninterrupted and rigid, an easy handling of the machine, while the protective caps, though easy to open, are absolutely tight.

The invention will be fully described hereinafter and the features of novelty pointed out in the appended claim.

Reference is to be had to the accompanying drawings, in which—

Figures 1 and 2 are sectional plans showing, respectively, the rear and the front part of the improved driving-gear as applied to a bicycle. Fig. 3 is a detail side elevation of one of the pinions on the longitudinal transmitting-shaft with the means for connecting it with the said shaft. Fig. 4 is an end view of said shaft, and Fig. 5 is a face view of the pinion.

The bottom bracket or crank-hanger *a* has, as is usual, four lugs or sockets adapted for connection with the various frame bars or tubes. One of these sockets is widened to receive the pinion *b* on the front end of the longitudinal or side shaft *u*, which transmits motion from the crank-shaft *f* to the rear wheel. To the crank-shaft is rigidly attached a cup *g*, having ball-bearing races both upon its inner and upon its outer surface. A cone *e*, screwing into a normally stationary cover *d*, connected with the hanger *a*, engages the inner series of balls held by the cup *g*, while the balls engaging the cup on the outside work in conjunction with a bevel-wheel *i*. The latter is not rigidly connected with the crank-shaft *f*, but capable of a partial rotation thereon, being fastened to one end of a spring *h*, coiled within the hub *i'* of the pinion *i*, while the other end of the spring is rigidly secured to the cup *g* by fitting into one of a series of apertures provided in the central portion of the cup. Thus the pinion *i* is capable of a limited yielding torsional motion relatively to the shaft *f*. The spring is preferably in the nature of a band rectangular in cross-section, as with this construction sufficient torsional resistance is obtained even with a comparatively short spring. The inner end of the hub *i* has a disk $i^2$ with a groove to receive balls also engaging a corresponding groove in a cup *k*, screwed on the shaft *f*.

*j* is the customary cone, working in conjunction with ball-bearings and a cap *c*, and *l* is an adjusting screw-collar interposed between the cup *k* and cone *j*.

The pinion *i* is in driving engagement with another pinion *b*, mounted to rotate with the side shaft or transmission-shaft *u*, located within the frame-tube *n*. To secure a perfect meshing of the gears notwithstanding slight deformations of the frame, the shaft *u* carries a collar *v*, with a series of projections *v'* fitting into notches *b'* of the wheel *b*, the length of the notches being greater than that of the projections. The pinion *b* runs on balls interposed between it and two opposing cones *q* and *r*, the cone *r* screwing on the shank of the cone *q* and being held by a nut *s*, likewise screwing on said shank. The cone *q* screws on a stationary axle *p*, screwed or otherwise rigidly connected with the crank-hanger *a*. This axle and the cone *q* are provided with shoulders adapted to abut against each other, so as to always bring the ball-bearing race to the same point, even if the cone has been reground. The cones *q* and *r* and the nut *s* are held in place on the axle *p* by another nut *t*.

*m* and *o* are caps to exclude dust.

At the rear end of the transmission-shaft *u* the same construction is duplicated, as will be readily understood by reference to Fig. 1.

The axle $p$, on which the rear pinion $b$ rotates, is here secured to an extension $w$ of the rear-wheel hub 4, which extension at the same time forms a gear-case.

$z$ represents washers on the rear axle 3, and 1 is the nut at one end of the axle, while at the other end is located the step 7.

6 is the lug or socket of the horizontal rear stay on the left side of the bicycle.

On the axle 3 screw the two cones 5, engaging balls, as usual, and working in conjunction with a cup 10 on the hub 4 and with a bevel-pinion $x$, rigidly connected with the hub.

$y$ is a cap completing the gear-case, and 2 represents the rear-fork members.

As shown in Fig. 2, I may secure to the crank-hanger $a$, on the inside thereof, one end of a spring 8, wound spirally around the hub $i'$ of the pinion $i$, the other end of said spring being secured to a rod or other connection 9, leading to a point within easy reach of the rider, as the handle-bar. It will be understood that a pull upon this connection will bring the spring 8 into frictional engagement with the hub $i'$, thus acting as a brake.

When the rider operates the pedals, the crank-shaft $f$ and plate $g$ will for a short period turn independently of the pinion $i$, owing to the elastic connection afforded by the spring $h$. As soon as the tension of the spring becomes sufficient to overcome the resistance the pinion $i$ will be rotated, transmitting motion to the shaft $u$ and to the hub 4 of the rear wheel. Jars due to various causes will be taken up by the spring $h$, and the latter will act as an equalizer, so that the driving power applied to the rear wheel will be practically uniform. The particular construction of the spring and its arrangement within the hub $i'$ render this part of the gear very compact and effective.

Another advantageous feature of my invention is the provision of the stationary axles $p$ for the pinions $b$ of the transmission-shaft $u$ and the particular manner of mounting and connecting these parts. I thus enable the pinions $b$ and their adjuncts to be readily removed and adjusted and secure an efficient driving action, even when the frame is slightly sprung out of true.

Various modifications may be made without departing from the nature of my invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

In a driving-gear, a driving-shaft carrying a gear-wheel, a driven part likewise carrying a gear-wheel, a framework, a tubular transmission-shaft extending in the direction from one gear-wheel to the other, axially-alining, spaced stationary studs or axles secured to the framework, pinions supported on said studs exclusively and meshing with the adjacent gear-wheels, compensating unions between said pinions and the tubular shaft, ball-bearing cones on the studs, balls held between said cones and the pinions, and means carried by the studs, for locking the bearing-cones, the said studs extending through the pinions and into the transmission-shaft, and the latter being supported wholly upon the studs, through the medium of the pinions.

In witness whereof I have hereunto set my hand in presence of two witnesses.

OCTAVE ROBERT.

Witnesses:

ARMAND PICARD,

EDWARD P. MACLEAN.