(No Model.) 2 Sheets—Sheet 1.

# E. G. LATTA.

## VELOCIPEDE.

No. 555,648. Patented Mar. 3, 1896.

Fig. 1.

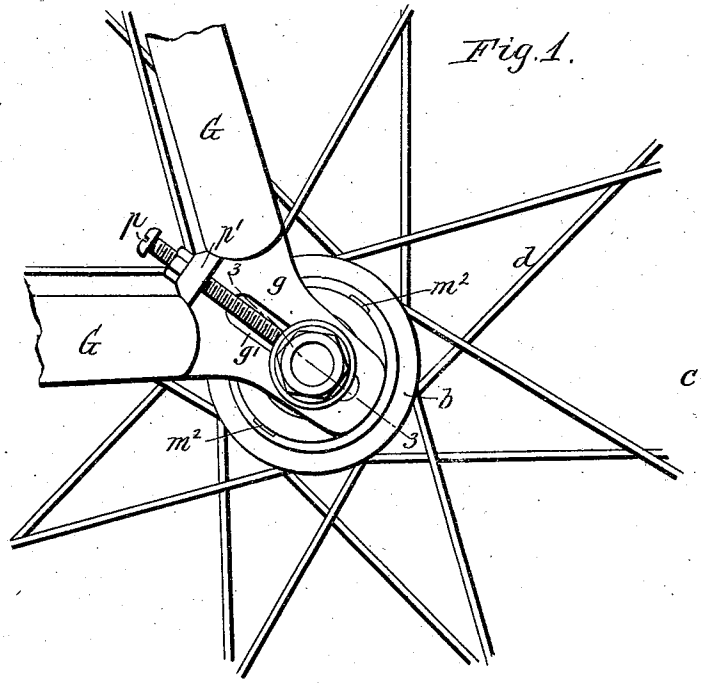



Fig. 2.

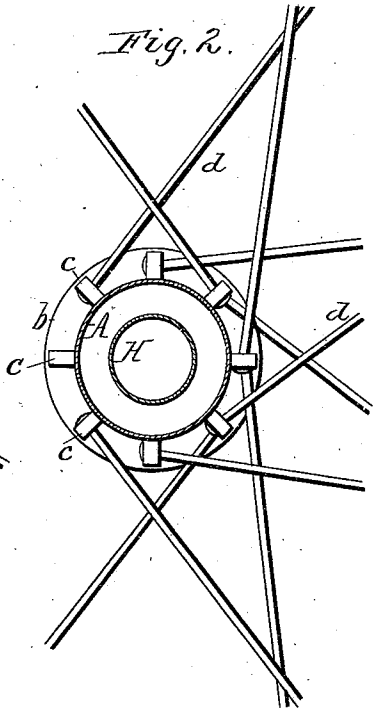



Fig. 3.

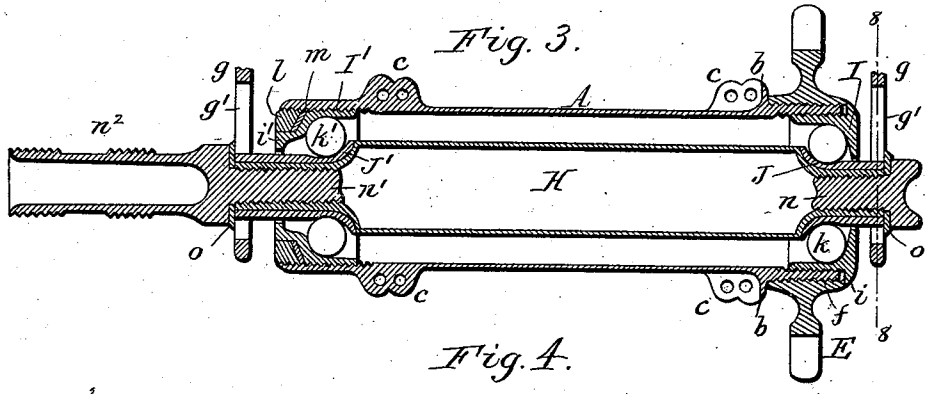



Fig. 4.

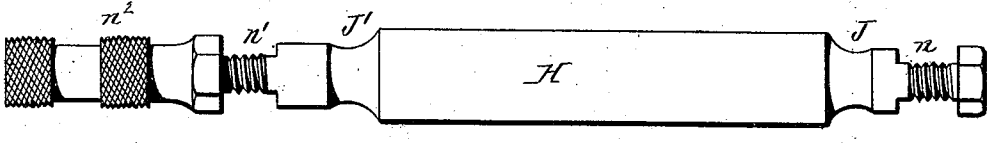



Fig. 5.

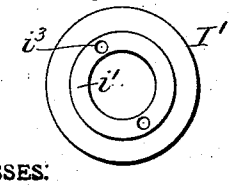



Fig. 6.

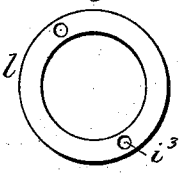



Fig. 7.

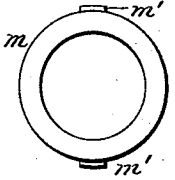
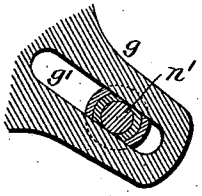



Fig. 8.




WITNESSES:

Chas. F. Burkhardt.

Theo. L. Popp.

E. G. Latta

By Wilhelm Bonner

INVENTOR.

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

# E. G. LATTA.

## VELOCIPEDE.

No. 555,648. Patented Mar. 3, 1896.

Fig. 9.

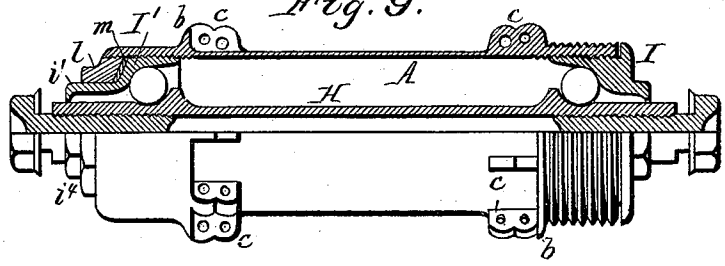



Fig. 10.

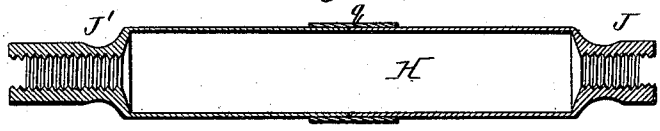



Fig. 11.

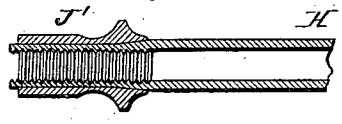



Fig. 12.

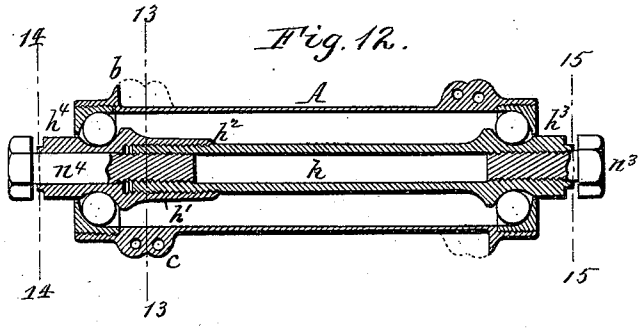



Fig. 13.

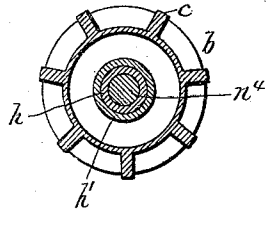



Fig. 14.

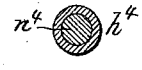
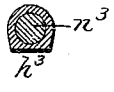



Fig. 15.




WITNESSES:

Chas. F. Burkhardt.

Theo. L. Popp

E. G. Latta INVENTOR.

By Wilhelm Bonner

ATTORNEYS.

ANDREW B. GRAHAM, PHOTO-LITHO. WASHINGTON, D.C.

# UNITED STATES PATENT OFFICE.

EMMIT G. LATTA, OF FRIENDSHIP, NEW YORK, ASSIGNOR TO THE POPE MANUFACTURING COMPANY, OF PORTLAND, MAINE.

## VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 555,648, dated March 3, 1896.

Application filed April 25, 1895. Serial No. 547,100. (No model.)

*To all whom it may concern:*

Be it known that I, EMMIT G. LATTA, a citizen of the United States, residing at Friendship, in the county of Allegany and State of New York, have invented a new and useful Improvement in Velocipedes, of which the following is a specification.

This invention relates more especially to velocipede-wheel hubs which are provided with radial studs or lugs to which the inner ends of the spokes are secured—as shown, for instance, in Letters Patent of the United States No. 341,811, granted to me May 11, 1886.

The objects of my present invention are to produce a light wheel-hub possessing great strength and durability, to provide the same with ball-bearings of improved construction, to provide a light shaft of considerable strength, and to secure the same to the velocipede-frame by neat and reliable means which permit the frame to be made light and strong and which permit the removal of the wheel from the frame without unduly springing the latter or disturbing the adjustment of the ball-bearings.

In the accompanying drawings, consisting of two sheets, Figure 1 is a side elevation of the rear portion of the frame and the central portion of the rear wheel of the velocipede embodying my improvements. Fig. 2 is a cross-section of the wheel-hub. Fig. 3 is a longitudinal section of the same in line 3 3, Fig. 1, the left-hand portion of the hub being taken through diametrically opposite spoke-studs and the right-hand portion thereof on one side of the said studs. Fig. 4 is a detached elevation of the wheel-shaft and parts connected therewith, showing the fastening-bolts partly unscrewed. Fig. 5 is a detached face view of the adjustable bearing-cup. Fig. 6 is a similar view of the check-nut. Fig. 7 is a similar view of the locking-washer. Fig. 8 is a cross-section in line 8 8, Fig. 3. Fig. 9 is a sectional elevation of the wheel-hub, showing a modified construction of the shaft, bearing-cup, and check-nut. Fig. 10 is a detached longitudinal section of a modified construction of the shaft. Fig. 11 is a fragmentary longitudinal section of another modification of the shaft. Fig. 12 is a longitudinal sectional elevation of a front wheel-hub, showing a modified construction of the means for adjusting the bearings. Figs. 13, 14, and 15 are cross-sections on the correspondingly-numbered lines in Fig. 12.

Like letters of reference refer to like parts in the several figures.

A represents the tubular hub of the wheel, which is provided at a short distance from each end with an annular flange *b* formed integrally therewith.

*c* represents perforated studs which project radially from the wheel-hub and receive the inner ends of the spokes *d*. These spoke-studs are arranged in two annular rows on the inner sides of the flanges *b* and their outer sides are connected to said flanges, while their bases or inner ends are connected to the body of the hub, as shown in Figs. 3 and 9, the hub, flanges, and spoke-studs being formed in one piece. The inner ends of the spokes may be secured to the spoke-studs in any suitable manner. In the construction shown in the drawings they are formed with heads which bear against the rear sides of the studs, and each stud is provided with two perforations arranged side by side and receiving two adjacent spokes which extend in opposite directions from the stud.

The annular flanges *b* stiffen and reinforce the spoke-studs and enable them to be made smaller without liability of bending or breaking. The flanges also improve the appearance of the hub and enable the ends of the hub to be nickel-plated and easily kept clean.

The hub is preferably constructed of a bar of steel of the diameter of the flanges *b*, through which is bored a hole of uniform diameter from end to end of the hub. After boring the bar its surface is turned off so as to leave a pair of collars of the size shown at the left-hand side of Fig. 3, and these collars are then milled out at regular intervals to form the radial studs *c* and flanges *b*, as shown in Figs. 2 and 3, after which the holes for the spokes are drilled in the studs. The holes are preferably formed at such an angle that the spokes extend outwardly from the hub nearly at right angles to the radial studs. The spokes are headed at their inner ends and passed through the perforated studs and their

outer ends are secured to the rim of the wheel in any ordinary manner.

E is the usual sprocket-wheel arranged upon one end of the wheel-hub, the hub of the sprocket-wheel being provided with an internal screw-thread, which engages with an external thread *f*, formed on the wheel-hub, as shown in Fig. 3. The hub of the sprocket-wheel bears against the adjacent flange *b* of the hub.

G represents the tubular rear members of the velocipede-frame *g*, the end portions thereof having oblique slots *g'*, which are preferably closed at both ends, as shown, and H the stationary shaft of the rear wheel-hub.

I is a combined bearing-cup and check-nut arranged in one end of the wheel-hub, preferably the right-hand end, and I' is an adjustable bearing-cup arranged in the opposite end of the hub.

J J' are grooved collars or cones surrounding the end portions of the shaft H, and *k k'* two rows of balls interposed between said bearing-cups and cones.

The hub is provided in its end portions with internal screw-threads, with which engage external screw-threads formed in the bearing-cups I I'. The bearing-cup I, located at the same end of the hub as the sprocket-wheel E, is formed with a flange *i*, which overlaps and bears against the outer end of the hub of the sprocket-wheel.

*l* is a check-nut engaging with the internal screw-thread in the left-hand end of the wheel-hub, and *m* is a locking washer or ring interposed between said check-nut and the adjacent face of the adjustable bearing-cup. This locking-washer is provided with radial wings or projections *m'*, which enter internal longitudinal slots $m^2$, formed in the adjacent portion of the wheel-hub and extending outward to the end of the hub, as shown in Fig. 1. The adjustable bearing-cup is formed with a contracted extension *i'*, which passes through the locking-washer *m* and the check-nut *l*, and this extension and the check-nut are formed in their outer faces with holes $i^3$ for receiving a pin-wrench, whereby these parts are turned. The locking-washer is preferably made concavo-convex, as shown in Fig. 3, to give the check-nut a longer bearing in the hub. The bearing is adjusted for taking up wear by loosening the check-nut *l*, screwing the adjustable bearing-cup I' into the hub as far as desired, and then locking the parts in place by tightening the check-nut.

By constructing the wheel-hub in the manner herein shown and described but a single operation is required for boring out the same ready for screw-threading and its cost is therefore less than that of a hub formed in its ends with shoulders or recesses for the bearings.

If desired, the outer ends of the adjustable bearing-cup and the check-nut may be formed with projecting hexagonal nuts $i^4$, to fit an ordinary wrench, as shown in Fig. 9, instead of being flush and formed with holes for a pin-wrench.

Both of the constructions described permit the ball-bearing to be adjusted without removing the check-nut and without loosening the frame connections and affecting the tension of the driving-chain.

The shaft H is preferably constructed of soft-steel tubing and has its end portions reduced, and these reduced portions are surrounded by the bearing-cones or grooved collars J J'. The operation of reducing the end portions of the tubular shaft thickens the same, as shown in Fig. 3, and the cones are hardened and shrunk on these thickened end portions, forming a comparatively light shaft possessing great rigidity.

*n n'* represent clamping-bolts which pass through the slots of the frame and which engage with internal screw-threads formed in the reduced end portions of the shaft, as shown in Fig. 3.

$n^2$ is a step formed integrally with the left-hand bolt *n'*.

*o* represents washers interposed between the heads of the clamping-bolts and the adjacent sides of the fork ends.

The clamping-bolts *n n'* serve simply to draw the fork ends against the ends of the shaft, the latter forming a rigid brace extending through the wheel-hub from one side of the frame to the other. The ends of the shaft and the cones mounted thereon are cut away on opposite sides, as shown in Figs. 4 and 8, and are fitted in the slots *g'* of the frame, whereby the shaft is prevented from turning and the bolts are at the same time relieved from supporting the load.

*p* represents one of the usual chain-adjusting screws turning in a lug *p'* located in the angle of the frame, such a screw being arranged on each side of the frame in a well-known manner.

In order to adjust the chain the clamping-bolts *n n'* are loosened slightly, the wheel-hub is shifted to the desired extent by the oblique screws *p*, and the clamping-bolts are then again tightened, this adjustment being accomplished without disturbing the adjustment of the ball-bearings.

When it is desired to remove the wheel from the frame the clamping-bolts *n n'* are removed to release the shaft, when, upon springing the frame sufficiently to disengage the flattened portions of the shaft from the slots of the frame, the wheel can be lowered and moved forward far enough to disconnect the chain from the sprocket-wheel without requiring the chain to be unjointed or dismembered. This method of removing the wheel permits both ends of the frame-slots to be closed and the fork ends to be safely made lighter than when the slots are open at one end for inserting and withdrawing the shaft.

In the modified construction of the shaft shown in Fig. 9 the bore of the hollow shaft

is of uniform diameter from end to end, but the inner bearing-cones are formed integrally with the shaft instead of separate therefrom. This construction is less desirable than that first described, because in order to be equally rigid it must be heavier.

In the modification shown in Fig. 10 the shaft is formed of two sections or halves, each carrying one of the inner cones and united at their inner ends by a sleeve $q$, preferably brazed to the sections. These shaft-sections are each formed from a single piece of solid steel and are hardened before being united by the sleeve.

In the modified construction shown in Fig. 11 the shaft is made of small thick tubing having its ends tapered and fitted into the hardened cones, which latter are shrunk upon the shaft.

All of these various modifications have the advantage of a hollow shaft-body strengthened at its ends by the fastening-bolts. They are all provided with flat-sided extensions seated in the slotted fork ends, and in all both ends of the shaft are substantially alike.

In the constructions shown in Figs. 1, 2, 3, and 4 the left-hand clamping-bolt $n'$ is extended to form a step for mounting, but if no step is required a bolt like that at the opposite end of the shaft may be employed, as shown in Fig. 9.

In Figs. 12, 13, 14, and 15 my improvements are shown in connection with a front wheel-hub. The exterior construction of the hub is the same as that of the rear wheel-hub hereinbefore described, except that its end portions are larger than its central or body portion, no provision for a sprocket-wheel is necessary, and but seven spoke-studs are shown at each end of the hub. The hub-bore is recessed or enlarged at each end to form annular shoulders against which the inner ends of the bearing-cups rest.

The hollow shaft is constructed of two telescopic parts or sections $h$ $h'$ connected by a screw-threaded joint $h^2$. One of these sections, preferably the right-hand section, is formed with a flat-sided extension $h^3$, which fits in a corresponding opening or slot in the adjacent fork-arm so as to hold the shaft against turning therein, while the other shaft-section is provided with a round or cylindrical extension $h^4$, which is seated in a similarly-shaped opening in the other fork-arm, so that it may be turned therein. The clamping-bolt $n^3$ rigidly clamps the long section of the shaft to the right-hand fork-arm, while the opposite bolt $n^4$ passes through the short shaft-section and engages with an internal screw-thread formed in the inner end of the long section. In adjusting this bearing the left-hand bolt is slightly loosened, and the short section of the shaft is unscrewed from the long section until the desired adjustment is effected, after which the bolt is again tightened.

A hub with recessed ends, as shown in Fig. 12, cannot be made so quickly as that shown in Fig. 3, but it is preferable for the front hub, as it permits both ends to be made alike externally, locates both rows of balls near the ends of the hub and comprises fewer parts, while having the advantages of straight spokes secured to the hub by integral studs and flanges, the hollow shaft, the neat connection of the latter to the fork and its easy removal therefrom.

I claim as my invention—

1. A wheel-hub provided with an annular row of radial spoke-studs and an integral annular reinforcing-flange connecting the studs with the body of the hub, substantially as set forth.

2. A wheel-hub having integral annular flanges near each end thereof, and integral spoke-studs adapted to receive the inner ends of the spokes and connected at their bases to the body of the hub and at their outer sides to said reinforcing-flanges, substantially as set forth.

3. A wheel-hub consisting of a tubular body having a substantially uniform external diameter, and a bore of uniform diameter throughout its length and provided near each end thereof with spoke-studs and reinforcing-flanges connecting the spoke-studs with the body of the hub, substantially as set forth.

4. The combination with a shaft having a bearing-cone, of a wheel-hub having an internal screw-thread, an externally-screw-threaded bearing-cup engaging with the hub and surrounding said bearing-cone a row of balls arranged between the cone and cup, and a check-nut arranged in the wheel-hub on the outer side of the bearing-cup, said bearing-cup having an extension which passes outwardly through said check-nut, whereby the same can be turned without removing the check-nut, substantially as set forth.

Witness my hand this 13th day of April, 1895.

EMMIT G. LATTA.

Witnesses:
C. J. RICE,
H. F. KLEE.