(No Model.)

3 Sheets—Sheet 1.

E. G. LATTA.

VELOCIPEDE.

No. 347,357. Patented Aug. 17, 1886.

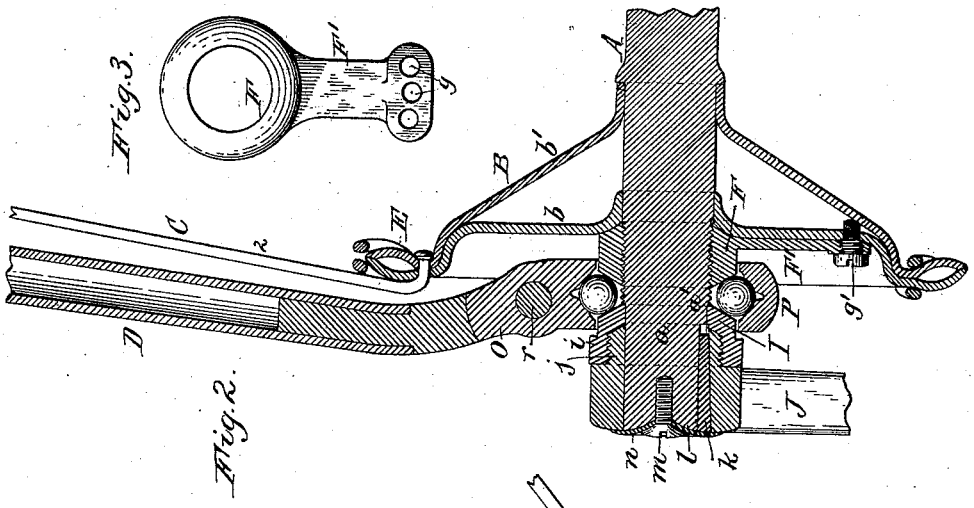

Fig. 3.

Fig. 2.

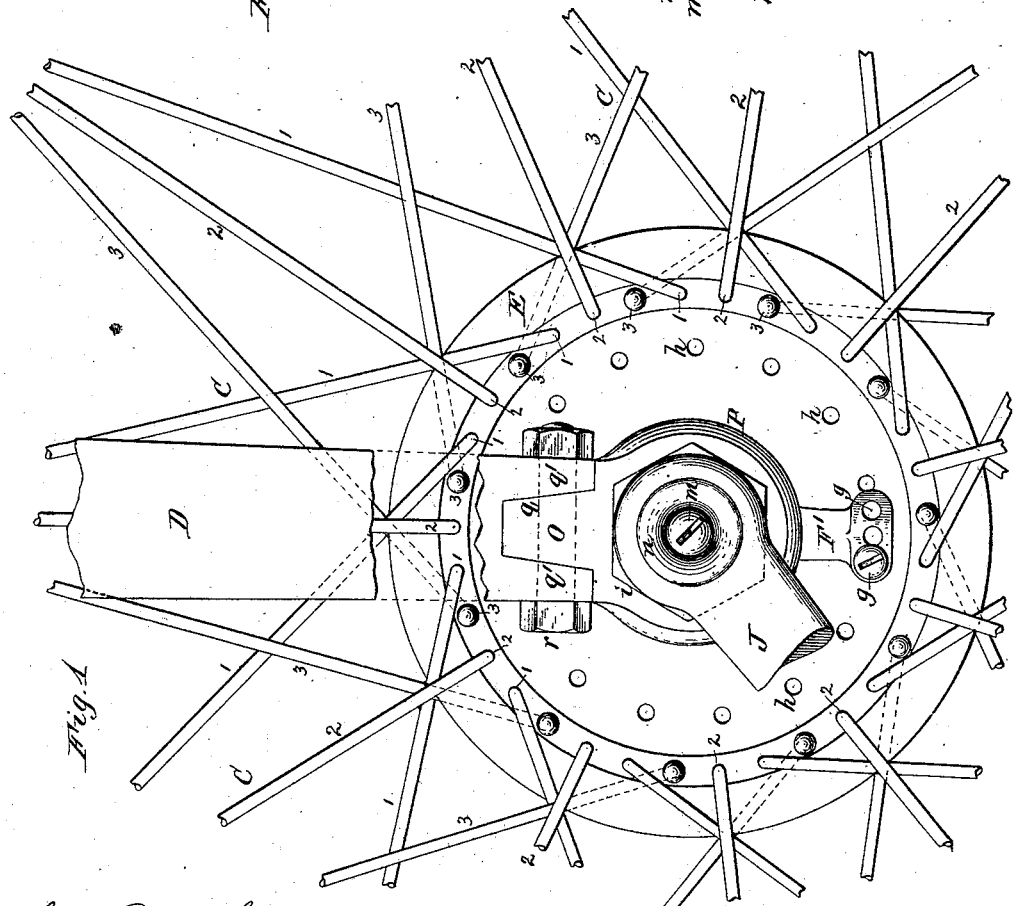

Fig. 1.

Witnesses.
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(No Model.) 3 Sheets—Sheet 2.

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VELOCIPEDE.

No. 347,357. Patented Aug. 17, 1886.

Fig. 4.

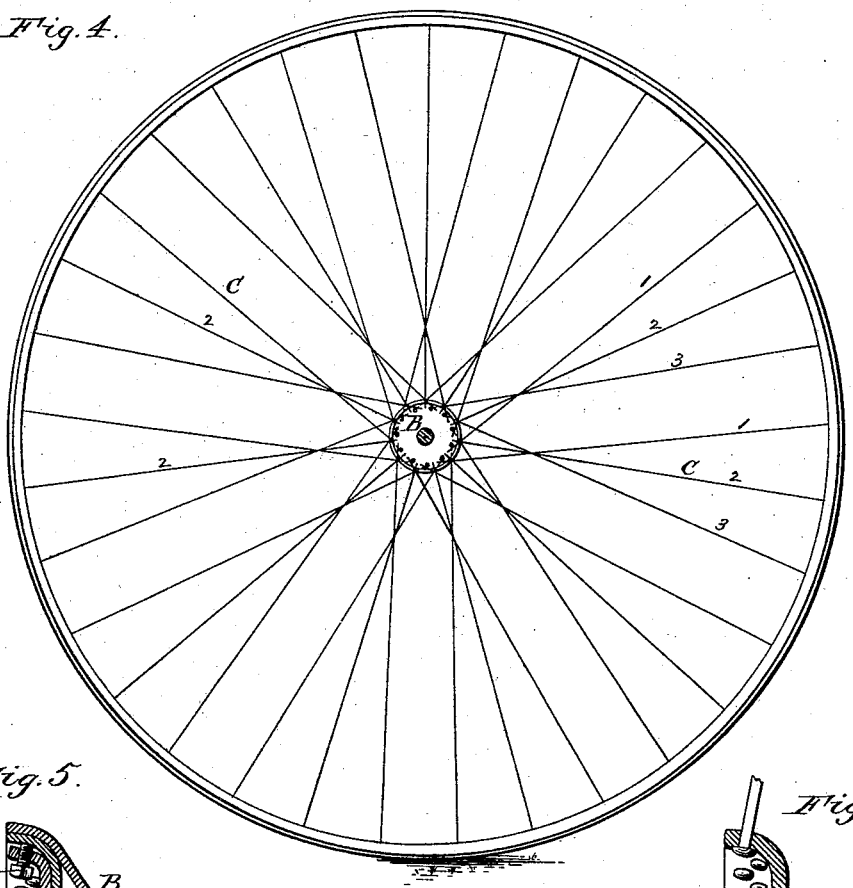


Fig. 5.

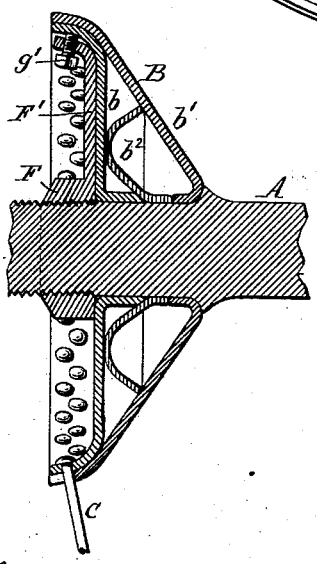


Fig. 6.

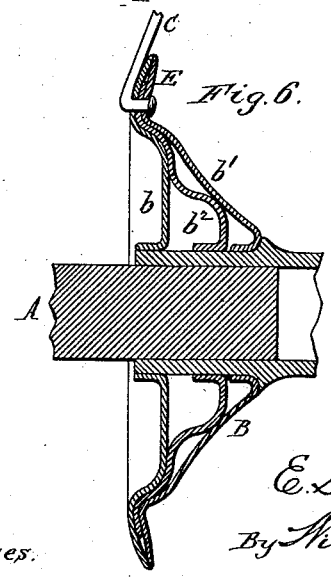
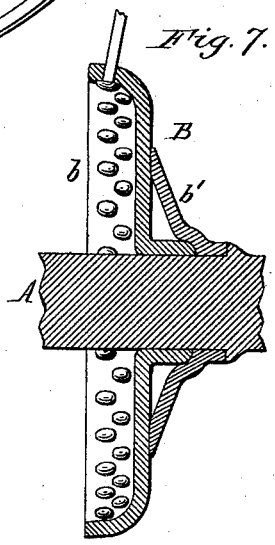


Fig. 7.



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(No Model.) 3 Sheets—Sheet 3.

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VELOCIPEDE.

No. 347,357. Patented Aug. 17, 1886.

Fig. 8.

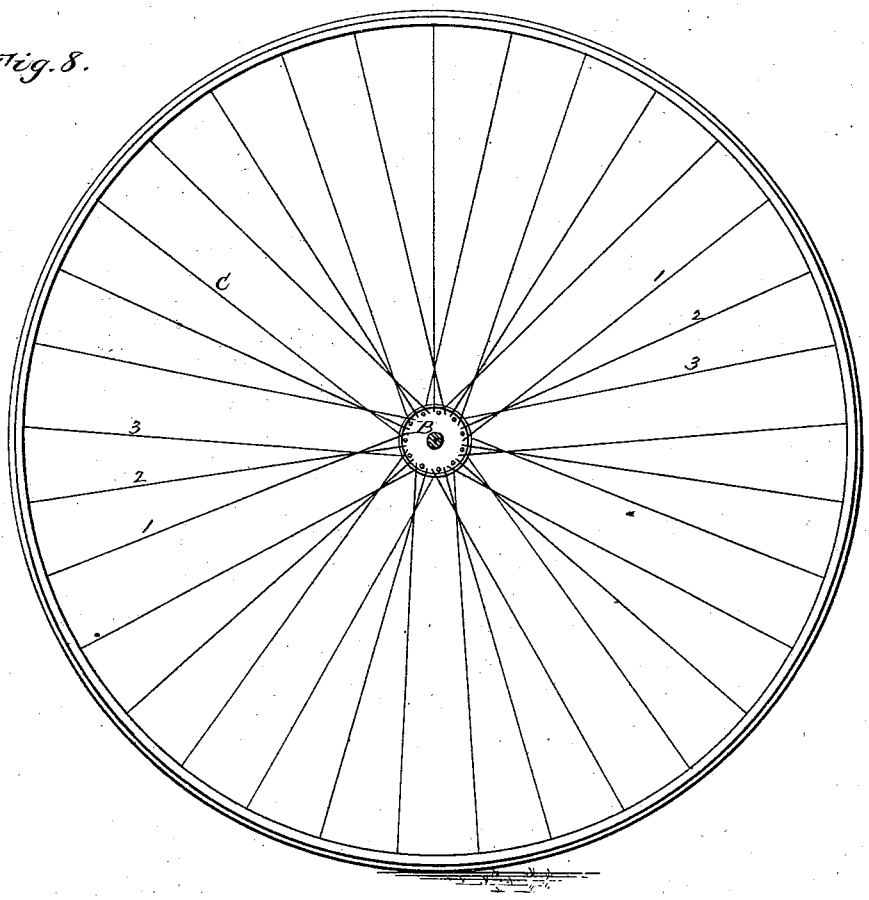
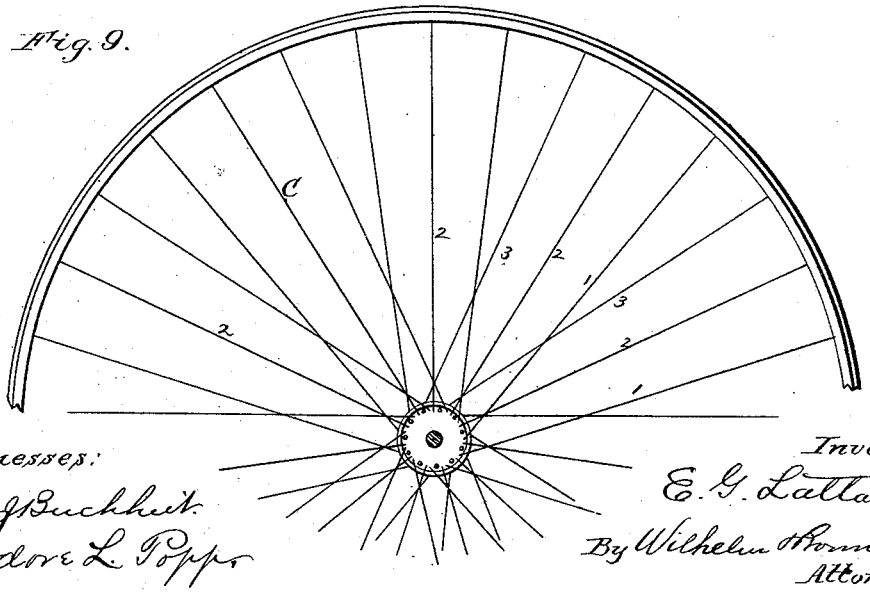


Fig. 9.



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Theodore L. Popp.

Inventor:
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UNITED STATES PATENT OFFICE.

EMMIT G. LATTA, OF FRIENDSHIP, NEW YORK, ASSIGNOR OF ONE-HALF TO ADRIAN C. LATTA, OF SAME PLACE.

VELOCIPEDE.

SPECIFICATION forming part of Letters Patent No. 347,357, dated August 17, 1886.

Application filed September 15, 1885. Serial No. 177,162. (No model.)

To all whom it may concern:

Be it known that I, EMMIT G. LATTA, of 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 to an improvement in velocipedes, and the object of the invention is to reduce the weight and increase the strength of the wheel, to support it in the fork or frame in a more secure manner, to provide a simple, light, and effective adjustment for the ball-bearings of the wheel, and to fasten the cranks detachably to the axle in a smooth and compact manner.

My invention consists to these ends of the improvements which will be hereinafter fully set forth, and pointed out in the claims.

In the accompanying drawings, consisting of two sheets, Figure 1 is a side elevation of the central part of the wheel and connecting parts. Fig. 2 is a fragmentary sectional elevation of the wheel, axle, and connecting parts at right angles to Fig. 1. Fig. 3 is a detached view of the adjustable cone of the ball-bearing. Fig. 4 is a side view of the wheel, showing the spokes arranged in the same manner as in Fig. 1. Figs. 5, 6, and 7 are sectional views showing modified constructions of the hub. Figs. 8 and 9 are side elevations of the wheel, showing slightly modified arrangements of the spokes.

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

A represents the axle, which may be either solid or hollow.

B represent the hubs secured to the axle; C, the spokes, and D one of the fork-arms. Each hub is composed of two annular plates of sheet metal, an outer plate, *b*, and an inner plate, *b'*, which are secured to the axle, one behind the other, and connected at or near their outer ends, so that both plates together form a hollow hub, in which one plate braces or supports the other. The hub-plates *b b'* are provided at their central openings with collars or flanges, which are secured to the axle by brazing or other suitable means. The outer plate, *b*, of each hub is made dish-shaped on its outer side, in the same manner as solid hubs, to receive the adjusting mechanism of the ball-bearing, while the inner plate, *b'*, is made more conical in form, so as to brace the outer plate.

Each plate *b b'* is preferably constructed of mild sheet-steel, and as rolled sheet metal is strongest in the direction in which it is rolled the two plates *b b'* of one hub are arranged with the grain in one plate at right angles to the grain in the other, thereby making the hub practically of the same strength in all directions. If it is desired to further strengthen the hub, this is easily accomplished by interposing between the plates *b b'* an annular stiffening-plate, b^2, as represented in Fig. 5. This stiffening-plate may be made of strong metal and be extended outward far enough to receive the spokes, as represented in Fig. 6, in which case the hub-plates *b* and *b'* may be constructed of lighter sheet metal. The edges of the plates *b b'* are constructed with concavo-convex marginal flanges turned with their concave sides toward each other, as represented in Fig. 2, so as to form a hollow double-convex marginal flange or rim, E, on each hub. The spokes, which are attached to the hub, are drawn over the convex surface of this rim, thereby avoiding sharp bends in the spokes.

Heretofore concavo-convex rims have been employed on hubs, in which case the inner surface of the rim was concave; but by my improved construction a convex surface is provided both on the inner and outer sides of the hub-flange without a material increase of the weight. This construction is very desirable for laced spokes or Pausey's variety of tangential spokes.

The spokes C, represented in the accompanying drawings, are arranged in groups, each of which contains one direct or radial spoke and two laced or tangential spokes, the latter being arranged on opposite sides of the radial spoke. The direct or radial spokes are designated by the figure 2, and the laced or tangential spokes by the figures 1 and 3. In the arrangement of the spokes represented in Figs. 1, 2, and 4, the tangential spoke No. 1 of the first group is headed on the inner side of the hub, passes through the latter inside of the rim E, is bent closely around the outer convex side of the rim, passes underneath the direct spoke No. 2 of the second group, and between said spoke and spoke No. 3 of the third

group, interlocks with spoke No. 3 of the fourth group about one inch from the edge of the rim E, and then with spoke No. 3 of the fifth group and spoke No. 2 of the third group. The spokes No. 3 are headed on the outside of the hub, and pass over the convex rim E on the inner side of the same, and extend outwardly to the rim or felly of the wheel in an opposite direction from spokes No. 1 and interlock with the spokes Nos. 1 and 2. The direct or radial spokes No. 2 are headed on the inner side of the hub, pass through the latter, and are bent against the outer side of the convex rim E. As the spokes No. 1 are bent sharply around the convex rim to interlock with the spokes No. 3, the spokes No. 2 pass over the spokes No. 1 on the edges of the rim without interference. The spoke No. 1 of the first group, spoke No. 2 of the third group, and spoke No. 3 of the fifth group all cross each other at the same point, where they are preferably secured together by soldering or by tying with fine wire. This arrangement of the spokes braces the wheel most completely in three directions—forward, backward, and outward—and possesses all the advantages of direct spokes in resisting the shocks received in passing over obstructions and of tangential spokes in resisting the twisting strains when heavy pressure is applied to the cranks. This enables the wheel to better resist side strains or buckling than a system of spokes composed wholly of direct or tangential spokes. It is obvious that the number of spokes can be increased or reduced, and that the angle of the tangential spokes can be varied. In Figs. 8 and 9 the angle of the tangential spokes differs somewhat from that shown in Fig. 4. The outer ends of the spokes are secured to the rim of the wheel in any suitable or well-known manner.

F represents the inner adjustable cone of the ball-bearing provided with an internal screw-thread, whereby it is attached to the threaded portion of the axle A.

F′ is an arm formed on the cone F, for turning the latter on the axle. The outer end of the arm F′ is provided with one or more screw-threaded openings, *g*, which receive a set-screw, *g′*, by which the cone F is secured in position on the hub. The latter is provided with a circular series of openings, *h*, in either of which the end of the set-screw can enter.

When it is desired to adjust the cone F, the screw *g′* is withdrawn far enough to clear the opening *h* in which it was engaged, and the cone is then turned on the axle by means of the arm F′ until the proper adjustment is obtained. If the cone does not turn freely, the wheel may be turned until the head of the screw *g′* strikes against the fork, when by further turning the wheel the latter operates as a lever in turning the axle in the cone F. When the desired adjustment has been obtained, the cone is secured in position by turning the screw *g′* so as to engage it in the nearest opening *h*. A single opening, *g*, in the arm F′ provides an adjustment fine enough for all ordinary purposes; but by providing a number of openings, *g*, in the arm F′ a very fine adjustment is obtained.

Instead of providing openings *h* in the hub for holding the set-screw, the latter may enter between the heads of the spokes on the outer side of the hub, as represented in Fig. 5.

I represents the outer cone of the ball-bearing, and J represents the crank, which is detachably secured to the end of the axle A. The crank-boss is provided on its inner or rear side with a screw-threaded extension, *j*, and the cone I is provided on its outer side with an internally-threaded extension, *i*, into which the threaded extension *j* of the crank-boss engages. The extension *i* is made hexagonal or is otherwise formed to permit of the application of a suitable wrench for turning it. The end portion, *a*, of the axle is reduced in diameter, so as to form an annular shoulder, *a′*, against which the outer cone, I, rests. The latter is firmly screwed upon the crank-boss and the crank is then slipped upon the reduced end *a* of the axle until the cone I rests against the shoulder *a′*. The crank is prevented from turning on the axle by a suitable key, *k*. The end of the axle is provided with a countersunk or recessed seat, *l*, which receives a screw, *m*, and washer *n*. The latter projects over the outer side of the crank-boss and holds the crank and the key *k* on the axle.

The screw and washer are preferably made separate, as shown; but, if desired, the washer may be omitted and the screw may be constructed with an enlarged head overlapping the outer side of the crank-boss.

When it is desired to remove the crank, the screw *m* and washer *n* are removed and the cone I is unscrewed from the crank-boss by applying a wrench to the extension *i*. The cone I is held against longitudinal movement by the shoulder *a′*, so that by turning the screw I the crank is forced from its seat on the axle far enough to permit its removal therefrom.

O is a tapering tongue or lug formed on the bearing-box P and projecting upwardly therefrom into a tapering recess, *q*, formed between the jaws *q′* at the lower end of the fork-arm.

r is the horizontal bolt, which passes through the fork-arm and the lug O and secures the bearing-box to the fork. This construction avoids the tendency of the ordinary joint to work loose, affords a longer bearing between the lug of the box and the jaws of the fork-arm, and enables the bolt *r* to draw the jaws *q′* tightly against the lug O. It also affords the greatest strength at the base of the lug O and at the base of the jaws *q′*, where the greatest strains are applied to these parts.

I do not wish to claim in this application for patent the manner of securing the spokes to the hub-flange in pairs—one on the inner side and one on the outer side of the hub-flange—as this forms the subject of a claim in another

application for patent filed by me December 26, 1885, and numbered 186,476.

I claim as my invention—

1. In a wheel for velocipedes, &c., the combination, with the axle, of a hollow hub composed of two annular plates of sheet metal, both secured to the axle, substantially as set forth.

2. In a wheel for velocipedes, &c., a hub composed of two annular plates of sheet metal arranged at an angle to each other and secured together at or near their outer edges, forming a braced hollow hub, substantially as set forth.

3. In a wheel for velocipedes, &c., a hub composed of two annular plates of sheet metal secured together at or near their outer edges, and provided with collars or flanges which surround their central openings, substantially as set forth.

4. In a wheel for velocipedes, &c., a hub composed of two annular plates secured together at or near their outer edges, and an interposed annular stiffening-plate, substantially as set forth.

5. In a wheel for velocipedes, &c., a hub constructed with a rim having a convex outer side and a convex inner side, constituting a double-convex marginal rim, substantially as set forth.

6. In a wheel for velocipedes, &c., a hub constructed with a hollow double-convex marginal rim, substantially as set forth.

7. In a wheel for velocipedes, &c., a hub composed of two annular plates, each constructed with a concavo-convex marginal rim, the rims in the two plates being secured with their concave sides against each other, forming a hollow double-convex rim, substantially as set forth.

8. The combination, with the rim and hub, of radial and tangential spokes connecting the hub with the rim, substantially as set forth.

9. The combination, with the rim and hub, of radial spokes and tangential spokes crossing the radial spokes both forwardly and backwardly, substantially as set forth.

10. The combination, with the rim and hub, of groups of spokes each containing a radial spoke and two tangential spokes crossing the radial spoke in opposite directions, substantially as set forth.

11. The combination, with the rim of the wheel, of a hub provided with a double-convex marginal rim and radial and tangential spokes bent around the inner and outer convex sides of the marginal rim, substantially as set forth.

Witness my hand this 5th day of September, 1885.

EMMIT G. LATTA.

Witnesses:
JNO. J. BONNER,
CARL F. GEYER.