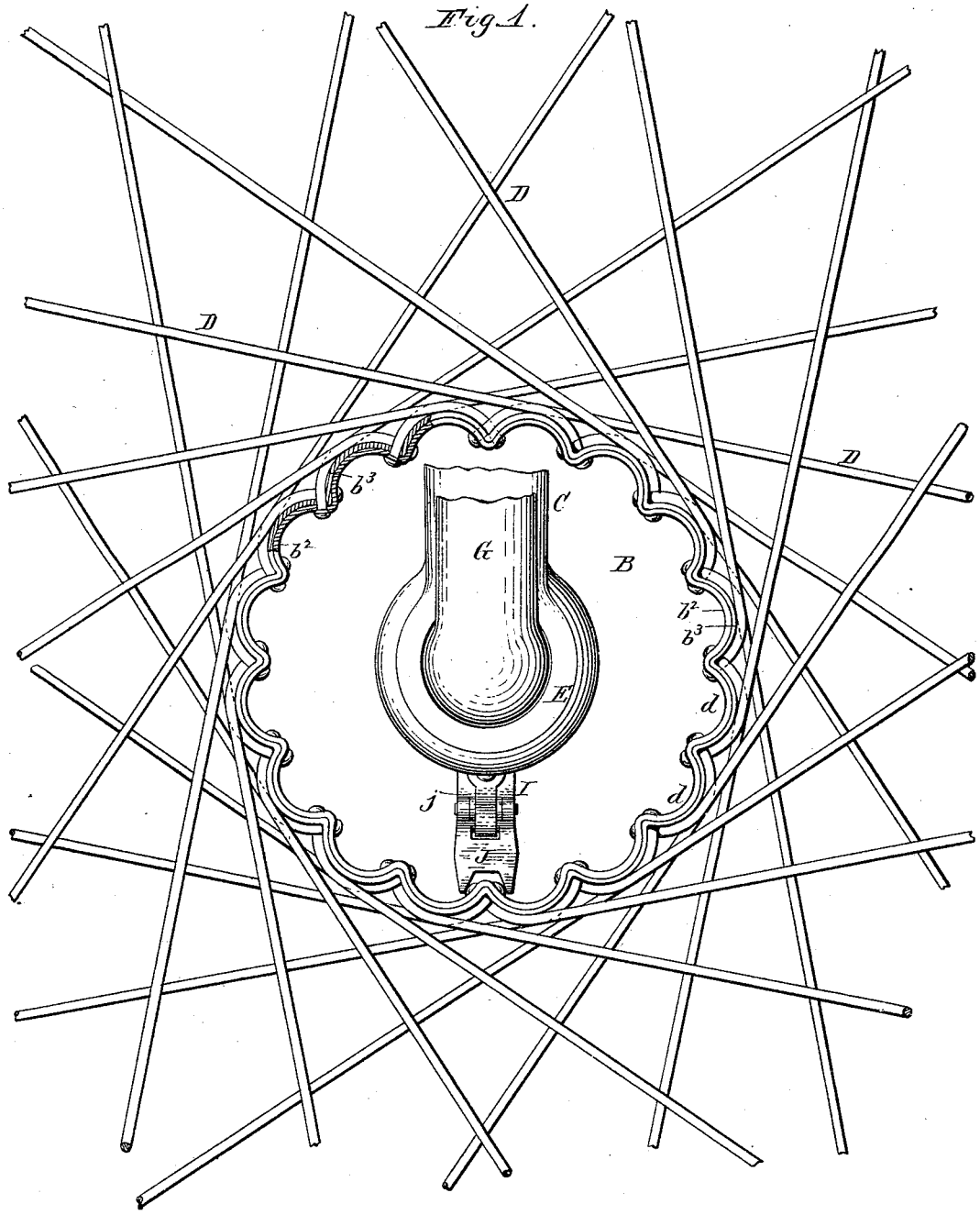
(No Model.) 3 Sheets—Sheet 1.

E. G. LATTA.

VELOCIPEDE.

No. 346,292. Patented July 27, 1886.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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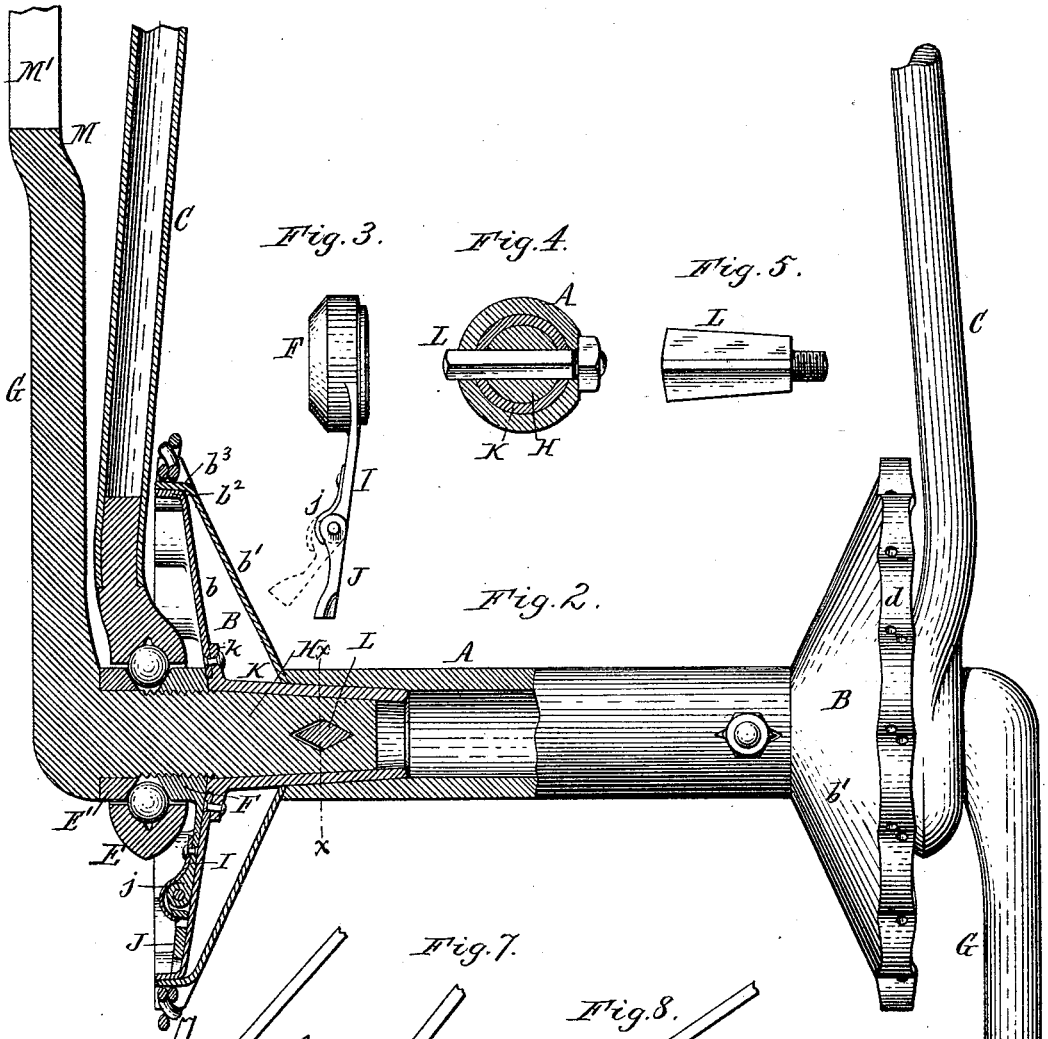

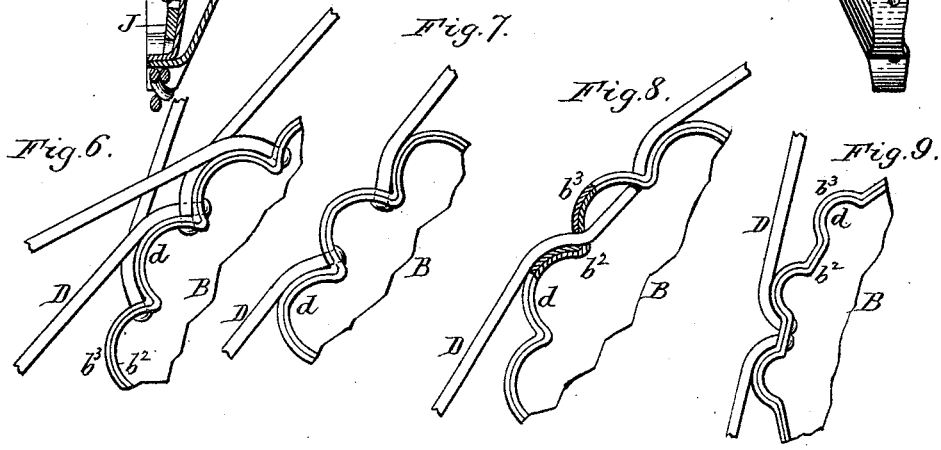

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(No Model.)

3 Sheets—Sheet 3.

E. G. LATTA.

VELOCIPEDE.

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Fig. 11.

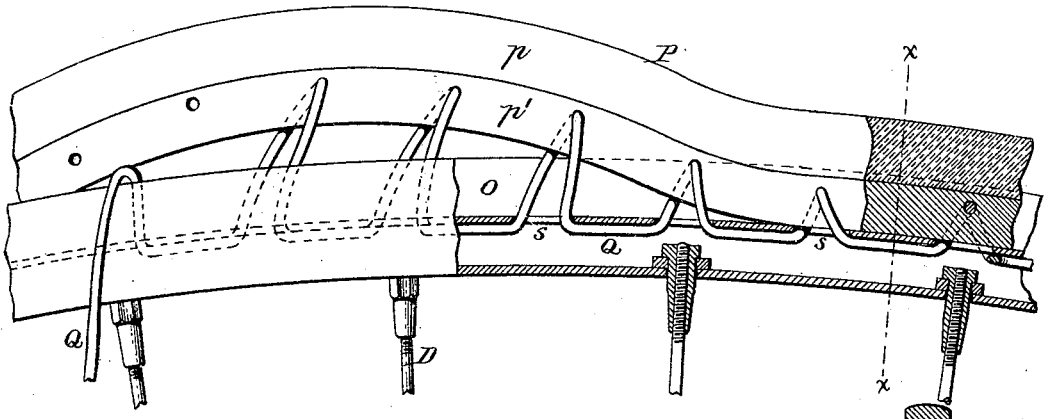


Fig. 12.

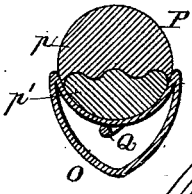
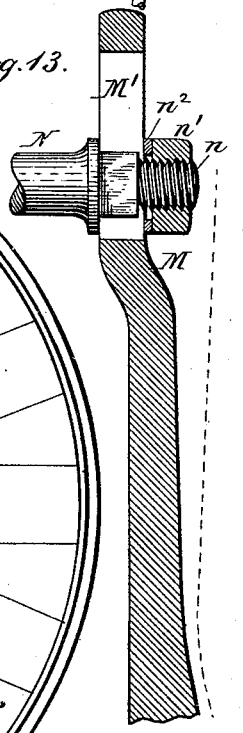


Fig. 10.

Fig. 13.



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By Wilhelm Bonnet
Attorneys.

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. 346,292, dated July 27, 1886.

Application filed November 2, 1885. Serial No. 181,621. (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 new and useful Improvements in Velocipedes, of which the following is a specification.

The object of this invention is to reduce the weight of the wheel and increase its strength and durability, to lessen the cost of manufacture, and provide a simple means of adjusting the ball-bearings without the use of tools, and to reduce the width of the tread while retaining the forks and cranks of the requisite thickness.

The 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 three sheets, Figure 1 is a side elevation of the central portion of the wheel, showing the spokes on one side only. Fig. 2 is an elevation at right angles to Fig. 1, partly in section. Fig. 3 is a detached elevation of the adjustable cone of the ball-bearing. Fig. 4 is a cross-section in line *x x*, Fig. 2. Fig. 5 is a plan view of the key which fastens the hub and crank to the axle. Figs. 6, 7, 8, and 9 are fragmentary elevations showing different modes of attaching the spokes to the hub-flange. Fig. 10 is a side elevation of the wheel, showing the spokes on one side only. Fig. 11 is a partly-sectional elevation of a portion of the rim of the wheel, illustrating the mode of securing the tire to the rim. Fig. 12 is a cross-section in line *x x*, Fig. 11. Fig. 13 is a sectional elevation of one end of the crank.

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

A represents the central tubular portion of the axle, and B the hubs secured to both ends of the axle between the forks C C. Each hub B consists of an outer disk or annular flange, *b*, and an inner similar disk or flange, *b'*, which is made somewhat more tapering or conical than the outer disk, *b*. Both disks *b b'* of the same hub are provided with marginal rims b^2 b^3, which are fitted closely together, the rim b^3 of the inner flange, *b'*, bearing against the outer side of the rim b^2 of the outer flange, *b*. The two flanges b^2 b^3 form together the marginal rim of the hub, which projects outwardly from the face of the outer flange, *b*. This marginal flange of the hub is composed of or provided with a series or succession of curved or segmental projections, *d*, which form supports for the inner ends of the spokes D. The spokes rest against the outer curved surfaces of the projections *d*, and pass through openings formed in these projections near the depressions between the same, and are secured in place at their inner ends by being headed, as represented in Figs. 1, 6, 7, and 9; or the spokes may be formed of a single length of wire and be passed through these openings, as represented in Fig. 8. The spokes resting with their inner portions against the outer sides of the curved projections *d*, pass alternately forward and backward from the hub to the felly, to which they are secured in any suitable manner. As the spokes pass over the segments *d* with an easy curve, the heads of the spokes are relieved from a great part of the strain to which the spokes are subjected, and as sharp bends in the spokes are avoided the necessary strength is retained without upsetting the wire. As the heads of the spokes are relieved to a large extent from the strain, the marginal flange of the hub can be made very light without danger of the heads drawing through, and as the spokes do not require upsetting they occupy less room where they cross each other, which permits the marginal hub-flange to be made narrower than if butt-ended spokes are used. The spokes pass from the segments *d* toward the felly in lines at right angles to radial lines drawn through their points of attachment to the hub, or nearly so, thus forming a true tangent-wheel. The inner ends of two adjacent spokes may cross each other immediately upon passing through the marginal hub-rim, as represented in Figs. 1 and 6; but various other arrangements may be resorted to, as illustrated in Figs. 7, 8, and 9.

The corrugations on the hub-rim are not necessarily true segments, but may be shaped in various forms, so as to prevent sharp bends in the spokes. The spokes which are attached to the marginal rim of the hub nearest the outer edge thereof, are preferably bent back upon the highest points of the segments *d*, behind the spokes which are attached to the rim

on the inner sides of the first-mentioned spokes, as represented in Fig. 1 and the right-hand portion of Fig. 2, for the purpose of preventing the possibility of the spokes drawing off in case the wheel should spring or buckle. The heads of the spokes are preferably countersunk in the marginal rim of the hub, and the spokes are interlaced at one or more places where they cross each other and secured to each other by small wires, or soldering, if desired.

E represents the bearing-box, which is secured to the fork-arm C in the usual manner.

E′ is the outer stationary cone of the ball-bearing, and F the inner movable cone.

G represents the crank, which is provided at its inner end with an axial extension, H, which extends into and is secured to the end of the tubular axle A. The movable cone F is provided with an internal screw-thread which works upon a screw-thread on the extension H of the crank, so that the movable cone is adjustable by turning it on the crank-extension.

I is an arm formed on the movable cone F for turning the same, and provided at its end with a spring detent or catch, J, which locks the arm in position when the cone has been adjusted. The catch J is pivoted to the end of the arm I, and pressed inwardly by a spring, *j*, which is secured to the arm I and bears with its free end against the catch J. The latter is constructed with a bifurcated end, which straddles the inner angle or ridge formed by the segments *d*, as represented in Fig. 1, and whereby the arm I is held against turning on the crank-extension H. If preferred, the catch J may project into the recesses or depressions formed on the inner side of the marginal hub-rim by the segments *d*. In order to adjust the movable cone, the catch J is swung outwardly, as represented in dotted lines in Fig. 3, to disengage it from the marginal rim of the hub, and the arm I is then used as a handle to turn the cone F until the desired adjustment is obtained, when the catch J is released and permitted to spring back, thereby locking the arm I and cone F in position. This construction dispenses with tools for the purpose of adjusting the cone, and also avoids the use of bolts or screw-threads in the hub.

K represents the sleeve which surrounds the inner end of the crank-extension H, and which enters the outer end of the tubular axle A. The sleeve K is constructed with a flange, *k*, at its outer end, to which the outer hub-flange, *b*, is secured by riveting or brazing. The inner hub-flange, *b′*, is also secured to the sleeve K by brazing. The sleeve K is preferably made tapering to insure a snug fit in the axle A, the end of which is turned out flaring to correspond with the taper of the sleeve. The inner end of the crank-extension H is also made tapering to fit snugly in the tapering sleeve K.

L represents a key which passes through the extension H, the sleeve K, and the tubular axle A, and secures these parts together. This key is made elliptical or diamond-shaped in cross-section, with its widest dimension arranged in the longitudinal direction of the axle, so that when the key is driven in it draws the crank-extension H firmly into its seat by wedging agaidst the outer sides of the openings in the sleeve K and axle A, and against the inner side of the opening in the extension H, thereby firmly securing the extension H against both lateral and twisting movements in its seat. This key has a larger bearing-surface against the parts than the key of the usual form, and does not weaken the parts to the same extent as the usual key. This construction is equally desirable for cranks which are secured to the axle outside of the bearing, in which case the arrangement of the parts is reversed by forming the tubular part on the crank and the solid part on the axle.

The outer portion of the crank is constructed with an offset, M, so that the slotted end portion, M′, of the crank projects forwardly or outwardly from the inner portion of the crank.

N represents the pedal-pin, constructed at its inner end with a bolt, *n*, and fastened to the slotted portion M′ of the crank by a nut, *n′*, and washer n^2. The offset M affords more room for the nut and washer to pass the fork, and furnishes a narrower tread or closer build at the hub without reducing the thickness of the forks and cranks.

O represents the hollow felly, which is made of any suitable or well-known construction, and P represents the tire fitted in the groove formed in the face of the felly. The outer portion, *p*, of the tire is made of rubber or other elastic material, and the inner portion, *p′*, of the tire, which rests in the groove or concave outer part of the felly, is composed of fibrous material—such as cotton braid or the like. The two parts of the tire are secured together by inserting the fibrous part in the mold in which the rubber is formed, and then introducing the rubber into the mold. The contact-surfaces of the parts *p p′* may be straight or curved, but I prefer to make these contact-surfaces corrugated, as shown in Fig. 12, to insure a more perfect union of the parts.

I am aware that rubber tires have been made with a hole in the center for the insertion of a core of cord or wire by which the tire is secured to the felly, and also that a cylindrical rubber tire has been covered with a strip of cloth to enable the cement to secure the tire to the felly. In the first-mentioned case the elasticity of the tire is impaired, and in the latter case no saving in the cost of the tire is effected. By my improved construction the quantity of rubber required for the tire is materially reduced and the tire is cheapened without reducing the elasticity or wearing qualities of the tire.

Q represents a fastening cord or wire by which the tire is secured to the felly. This cord or wire is drawn through holes in the tire and through holes *s* in the felly, so that

upon drawing the lacing-cord taut the tire is drawn into the groove or concave face of the felly and securely retained therein. The holes *s* in the felly may be the holes through which the spokes or spoke-nuts are inserted, but preferably extra holes are formed in the felly between the holes through which the spokes are inserted, as represented in Fig. 11. The lacing cord or wire is drawn through these holes by means of a curved needle, and is drawn up from time to time as the operation of lacing progresses, by which the tire can be raised out of the felly far enough to insert the cord in the next hole, and after a few loops or stitches are put in the cord is drawn up tight and a portion of the tire is thereby secured. The ends of the cord may be secured by a knot drawn down well into the tire, and one continuous or several short cords may be employed, as may be preferred. When a solid felly is employed, the lacing-holes are formed in a flange secured to the inner side of the felly, or small loops are secured to the inner side of the felly, through which the lacing-cord is drawn. The concave face of the felly is preferably coated with cement before the tire is secured to the same, and the felly afterward heated sufficiently to melt the cement, thereby securing the tire firmly to the felly and guarding against any slight movement of the tire on the felly which would tend to cut off the lacing-cord. If preferred, two lacing-cords may be employed—one on each side of the tire—and hooks or loops may be attached to both sides of the felly or tire to facilitate the operation of lacing. This means of securing the tire to the felly overcomes the tendency of the tire to become loose under exposure to heat or cold without adding extra weight to the wheel.

I claim as my invention—

1. The combination, with the rim and spokes, of a hub provided on its periphery with a succession of convex bearing-surfaces extending around the hub, and spokes having their bent inner portions resting against the outer sides of the convex bearing-surfaces, and their inner ends secured to the hub-flange, substantially as set forth.

2. The combination, with the rim and spokes, of a hub provided on its periphery with a succession of convex bearing-surfaces extending around the hub, spokes having their bent inner portions resting against the outer sides of the convex bearing-surfaces, and their inner ends passed through openings in the hub-rim and secured to the same by heads on the inner side of the hub-rim, substantially as set forth.

3. The combination, with the rim, of a hub provided with a peripheral series of convex segments, and spokes arranged in pairs, with their inner ends curved over said segments, the two spokes of each pair extending in opposite directions from the hub to the rim, substantially as set forth.

4. The combination, with the hub having a marginal rim and the outer wheel-rim, of two sets of tangent spokes arranged in pairs at the hub, and bent to cross or interlock to hold each other in place on the marginal hub-rim, substantially as set forth.

5. The combination, with the hub provided with an annular series of stops, of the movable cone F, provided with an arm, I, and spring-catch J, adapted to engage with said stops, substantially as set forth.

6. The combination, with the tubular axle A, provided with a tapering seat in its end, of a tapering end portion fitted in said cavity, and a key passing through the tubular axle and the end portion, substantially as set forth.

7. The combination, with the tubular axle A, provided with a tapering seat in its end, of a crank provided with a tapering extension, H, seated in the end of the axle, and a key whereby the extension H is secured to the axle, substantially as set forth.

8. The combination, with the hollow axle A, of a sleeve, K, secured with its inner end in the hollow axle, and provided at its outer end with a flange, *k*, and a hub-flange secured to the flange *k*, substantially as set forth.

9. The combination, with the axle and crank, of a connecting-key, L, made elliptical or diamond-shaped in cross-section and arranged to wedge in the longitudinal direction of the axle, substantially as set forth.

10. The combination, with the hollow axle A, sleeve K, and crank-extension H, of the transverse connecting-key L, made wedge-shaped in cross-section, substantially as set forth.

11. A compound tire for wheels, composed of an outer elastic part, *p*, and an inner fibrous part, *p'*, substantially as set forth.

12. A compound tire for wheels, composed of an outer elastic part, *p*, and an inner fibrous part, *p'*, united by corrugated contact-surfaces, substantially as set forth.

13. The combination, with the tubular rim having its outer portion provided with lacing-holes and the tire, of a lacing cord or wire passing through the tire and the lacing-holes in the outer portion of the tire, whereby the lacing-cord is concealed and protected, substantially as set forth.

Witness my hand this 24th day of October, 1885.

EMMIT G. LATTA.

Witnesses:
M. W. POTTER,
FRED H. RUE.