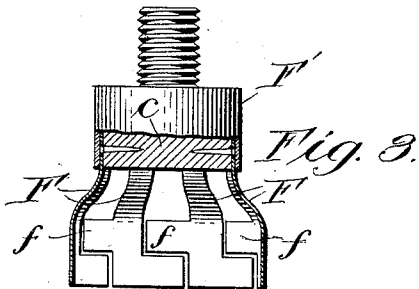
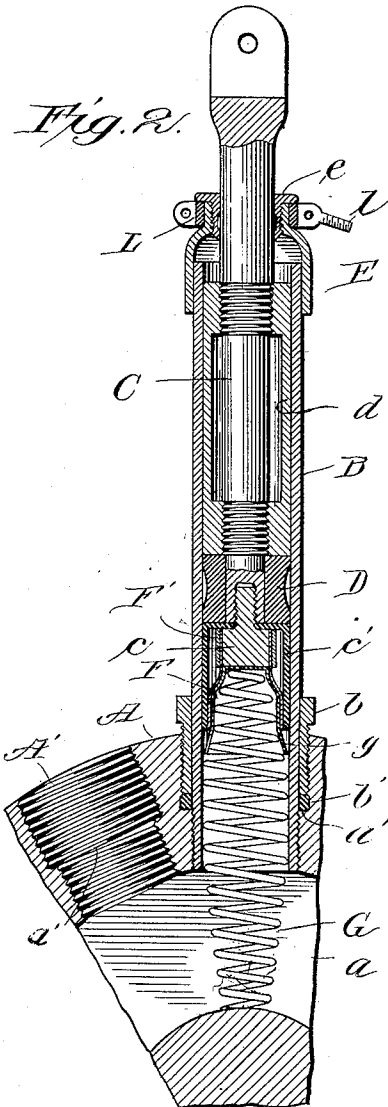
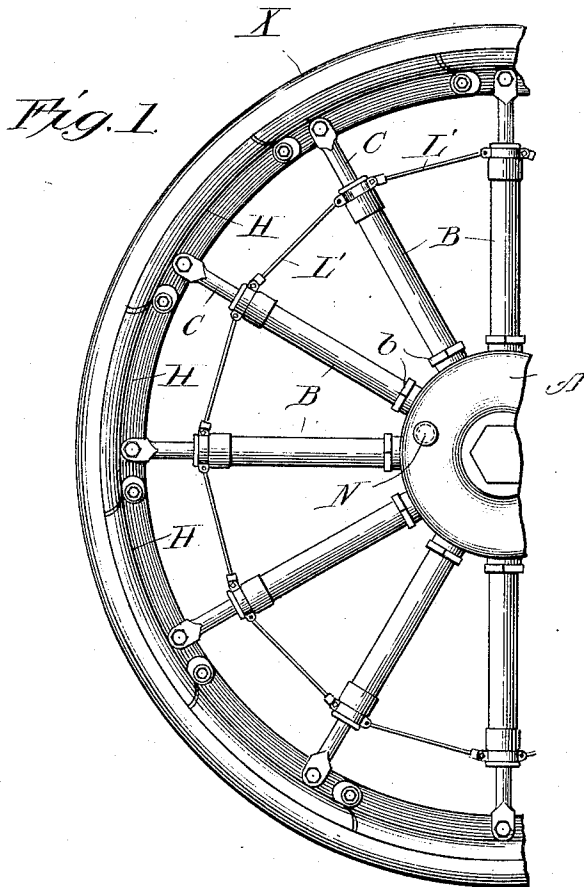


A. H. THIBAUT.
PNEUMATIC SPOKE WHEEL.
APPLICATION FILED JAN. 6, 1910.

1,007,901.

Patented Nov. 7, 1911.
3 SHEETS—SHEET 1.



Witnesses:

Harry S. Gaither
E. Lundy.

Inventor:

Arthur H. Thibault
by Frank D. Thomson
att'y

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3 SHEETS—SHEET 2.

Fig. 4.

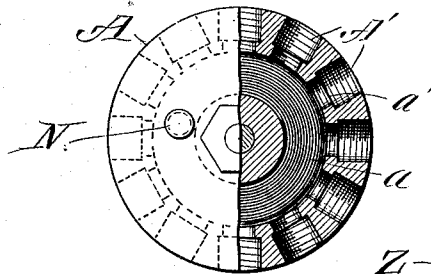


Fig. 7.

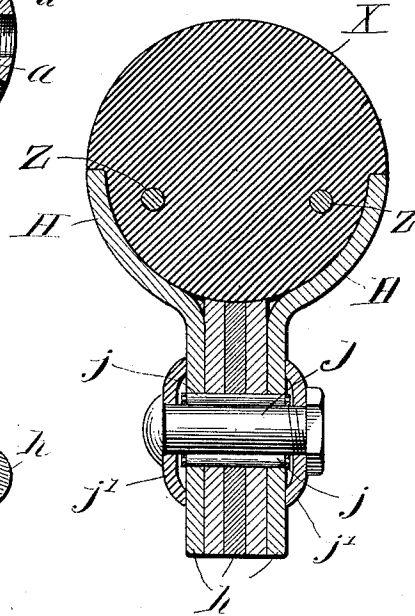


Fig. 5.

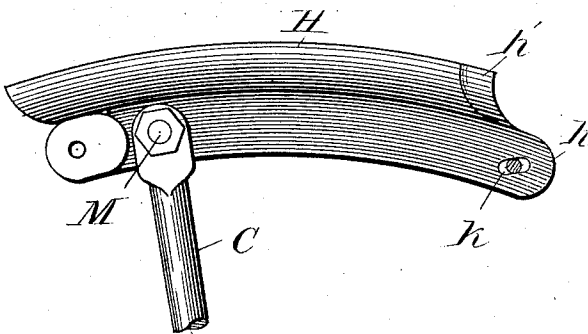


Fig. 8.

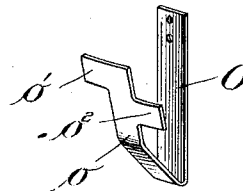
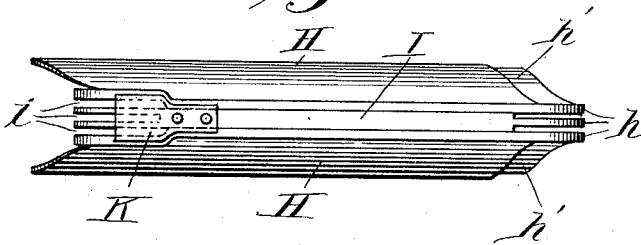


Fig. 6.



Witnesses:

Harry S. Gaither
E. Lundy

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Arthur H. Thibault
by Frank D. Thomson
att'y

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Fig. 9.

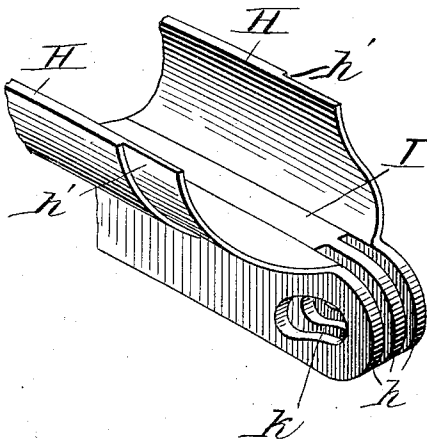


Fig. 10.

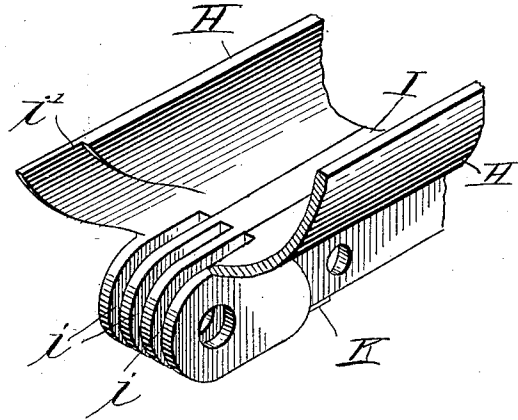


Fig. 11.

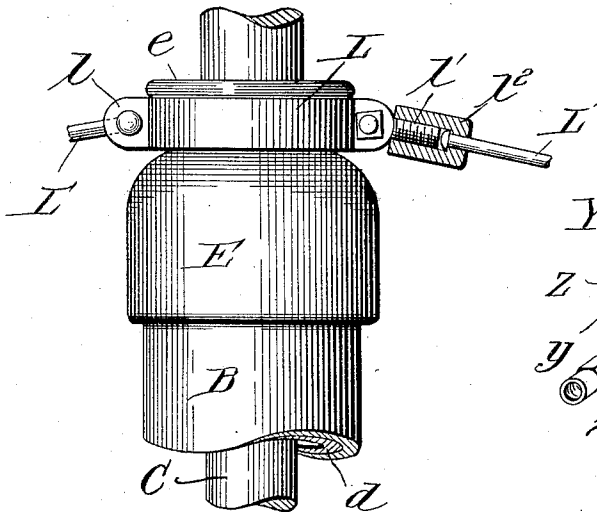
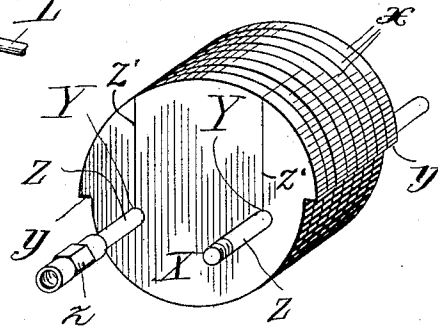


Fig. 12.



Harry S. Gaither
E. Rundy.

Arthur H Thibault
by Frank Thewissen
att'y

UNITED STATES PATENT OFFICE.

ARTHUR H. THIBAUT, OF SEATTLE, WASHINGTON.

PNEUMATIC-SPOKE WHEEL.

1,007,901.

Specification of Letters Patent.

Patented Nov. 7, 1911.

Application filed January 6, 1910. Serial No. 536,719.

To all whom it may concern:

Be it known that I, ARTHUR H. THIBAUT, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented new and useful Improvements in Pneumatic-Spoke Wheels, of which the following is a full, clear, and exact description.

My invention relates to pneumatic or air-cushioned spokes for traction-wheels wherein a sectional or segmental rim is used in connection with combined piston and cylinder spokes, which, through the medium of this construction, permits the circumference of the wheel to readily accommodate itself to the irregularities of the road-bed over which it is traveling.

More particularly stated, the present device is an improvement on what is shown and described in Letters Patent of the United States, No. 866,537, granted to me September 17th, 1907, for "pneumatic-spoke wheels", and it also relates to the manufacture of a strong and durable tire adapted to be used in connection with the same.

The object of my present invention is to provide means for insuring a more positive action between the piston portion of the spoke and the cylinder portion in which said piston reciprocates.

It is also an object of my invention to provide suitable means for protecting the joints at the ends of the segments of the rim, and to have these segments serve as a lever in the operation of the piston member of the spoke.

A further object consists in attaching the secured end of the spoke to the hub in an efficient manner, and to seal, as much as possible, the connection between the same. And a still further object is to provide means that prevent the wear on the tire caused by the movement of the rim segments at their point of articulation when the wheel is in use.

These objects I accomplish by the means and in the manner hereinafter fully described and as more particularly pointed out in the claims, reference being had to the accompanying drawings forming a part hereof, wherein,

Figure 1 is a vertical side elevation of one-half of one of my improved wheels. Fig. 2 is a longitudinal central section of one of the spokes and a portion of the hub to which it is connected, drawn to a larger

scale. Fig. 3 is a side elevation, on an enlarged scale, of the expander springs, used in connection with the inner end of the piston member of the spoke, showing it partly in section. Fig. 4 is a part side elevation and part trans-axial section of the hub. Fig. 5 is a detail view showing a side elevation of one of the sections of the rim. Fig. 6 is an underside view of the same. Fig. 7 is a transverse section of the rim taken through the joint of two adjoining sections drawn to a larger scale. Fig. 8 is a detail view showing in perspective, a slightly modified form of expander-spring. Figs. 9 and 10 are separated perspective views of the adjoining ends of two rim-segments, showing the peculiar interlocking construction of the same. Fig. 11 is an enlarged fragmental view of the upper end of the cylinder portion showing the means for strengthening the spokes. Fig. 12 is a perspective view of a small section of the improved tire adapted to be used in connection with this wheel.

Referring to the drawings, A, represents the hub of my improved wheel, that is preferably provided with an interior annular air-passage *a* arranged concentric with the axis thereof, and is provided with a plurality of radiating openings or spoke sockets A'. The interiors of these spoke-sockets are screw-threaded, and the inner portions thereof are, preferably, reduced in diameter, and form a slight shoulder *a'* near the center of depth thereof. Into the reduced portion of the sockets A' the lower screw-threaded portions of the cylindrical tubular member B of the spokes, are screwed down until their inner ends are flush with the outer circumference of the annular passage *a* of the hub and then an interiorly and exteriorly screw-threaded sleeve *b* surrounding the tubular member of the spoke, is screwed into the outer wider portion of the spoke sockets, until it seats firmly against and expands a suitable washer or gasket *b'* resting upon the shoulder *a'* above described. This construction holds the spoke securely in position and seals the socket so as to prevent the air escaping out of the same around the contained end of the spoke.

The outer portions or plungers C of the spokes, have bifurcated outer ends that are adapted to be secured to the segments of the rim, as will hereinafter be more fully described, and their inner portions enter the outer ends of and have longitudinal recip-

rocal play. in the cylindrical members B. The ends of the plungers within members B are tapped longitudinally and are adapted to receive the threaded portion of a bolt *c*, the head of which is enlarged and is adapted, when the bolt is screwed home to clamp and retain in place a suitable leather or rubber packing *c'*, the skirt of which spreads out and engages the inner circumference of the cylinder. Surrounding the plunger next this bolt *c* is an expansible packing D of rubber or other suitable material, the outer circumference of which is concave between its ends, and between this packing D and the outer end of the cylinder the plunger C is surrounded by an elongated sleeve *d*, which is of such diameter as to have sliding contact with the cylinder. The outer ends of the cylinders are closed by means of suitable tapered caps E, that have gland-nuts *e* tapped therein, through which the plunger is adapted to reciprocate.

In order to insure the outward pressure of the packing *c'* against the inner circumference of the cylinder and prevent escape of the air around and past the sides of the same, I provide an outwardly expanding bell-shaped cluster of irregularly shaped leaf springs F, F, that depend from and are suitably secured to the head of a bolt *c*, and arrange said springs so that their lower unsecured or free portions project downwardly and outwardly toward, and press the inner side of the packing against the inner circumference of the cylinder forming an air-pocket between the head of bolt *c* and the inner circumference of the cylinder. These springs are, preferably, L-shaped in side elevation and near the lower ends of the longer vertical member are provided with lateral wings *f*, *f*, that project, at substantially right angles thereto, to or near the vertical member of the adjoining spring and slightly above the horizontal member thereof, substantially as shown in detail in Fig. 3 of the drawings. These springs are retained in place by suitable pins passing through their collar into the head of the bolt *c*, which latter is prevented from becoming accidentally displaced, by means of a short sleeve surrounding and inclosing the same, substantially as shown. The air-pressure within the hub and lower portion of the spoke cylinder is usually sufficient to keep the plunger normally pushed outward from the center of the wheel to the limit of its movement, but, in order to positively provide for this, in the event of one of the spokes being out of commission by accident or otherwise, I prefer to place a suitable coiled expansion spring G between the head of the plunger and the inner wall of the air-chamber *a* of the hub. A bell-shaped shield *g* of metal or other suitable material is placed over the outer end of the spring and

conforms to the outside contour of the same in order to protect its coils from getting tangled with the lateral portions of the expander springs.

As before stated the rim or felly of my improved wheel is made up of a series of corresponding segments which when jointed together form a practically continuous concave seat for the tire. Each of these segments comprises a longitudinal rim-strip or backbone I, which is sandwiched between and suitably secured to the parallel inwardly flanged portions of corresponding rim-plates H, H, are curved laterally in opposite directions, as well as outward, to complete the trough or concave seat in which the tire X is placed. At one end of these segments, the extremities of strip I and plates H are formed to provide suitable knuckles, *i*, *i*, and at the other end with interspaced knuckles, *h*, *h*, adapted to engage and be pivotally connected to knuckles *i* of the next adjoining segment by a pivotal bolt J, the ends of which clamp convexo-concave washers, *j'*, against the sides of the joint so as to close the pivotal openings in said knuckles, and at the same time prevent the joints becoming too loose. The pivotal openings in knuckles *h* are elongated oblique to the circular alinement of the segments so as to permit of the inward yielding movement of the rim-segments when in contact with the ground, and if desired the pivotal openings in both knuckles *h* and *i* may be made wider or greater in diameter than the pivotal bolt J, as shown in Fig. 7 of the drawings, so as to accommodate a nest of anti-friction rollers *j* surrounding the barrel of the said bolt.

The plates H of each rim-segment are extended at one end beyond the pivotal point, and lap past the adjacent edges of the ends of the plates H of the next adjoining segment, and where the end portions of the plates of said segments lap past each other they are reduced in thickness as at *h'* and *i'* so as to permit of the yielding motion of the segments when rolling over the ground. A flat spring-plate K of suitable proportions is secured to the under-side of the rim near one end of each segment and is adapted to cover or close the opening between the interlocking segments, thereby preventing small particles of dirt, etc., from getting between the same.

The spokes are preferably strengthened and held in position by tying the same together at the upper ends of the cylinders. This is done by placing a band L around the upper end or neck of cap E, which band is provided on one side with a perforated lug L, in which the headed end of a tie-wire L' is retained, and is provided with an oppositely disposed lug that has a screw-threaded stud U, on which a swivel or

screw-threaded nipple l^2 , on the opposite end of the tie-wire is screwed.

The upper bifurcated ends of the plunger members of the spokes are, preferably, secured to the rim at a point slightly back of the lapping ends of the segments, and they are held in place by any suitable means, such as a bolt M, as shown. This off-setting of the pivotal point of the spoke and rim-segment, gives a lever effect to the operation of said rim-segments in operating the respective spoke, and this causes several segments to be simultaneously moved, and their spokes operated when the rim strikes an unusually large obstruction or irregularity in the road.

The improved tire X, that I prefer to use in connection with this wheel is made of solid material, such as the odd-and-ends or cast-off pieces of sole leather, belting, or fibrous material such as cotton, hemp and the like. I prefer to cut the same into suitably shaped disks x , x , and I provide two parallel openings Y, Y, extending from points within the same in alinement with each other throughout the length of the tire. These disks are arranged in order so that these holes aline with each other and then parallel wires Z, Z, are threaded through said holes, substantially as shown in detail in Fig. 12 of the drawings. The ends of the wires are each provided with turn-buckles z , z , that are tightened to bring the same together and in order to accommodate these turn-buckles, suitable parallel slots z' , z' , are cut radially from the openings Y, Y, to the outer circumference of a portion of the tire, as shown in Fig. 12. The tire is then given a coat of pitch, tar, or asphalt, after which it is placed in a mold under hydraulic pressure and shaped to the proper form, being kept at a temperature of about ninety-five degrees (95°) Fahrenheit, until set. The transverse radius of the upper segment of the tire is slightly greater than that of the lower or inner segment and where these two segments meet, in substantially a horizontal plane, they form suitable continuous shoulders or off-sets y , y , extending around the longitudinal sides of the tire, that rest upon the outer circumferential edges of the flated portions of the rim, when seated therein.

The modified pressure-spring O shown in detail in Fig. 8 of the drawing has a straight portion that is secured to the head of bolt c in the same manner as the preferred form. However, there is an off-set portion o that projects outwardly and upwardly from the lower end thereof, and at its upper end said off-set portion is provided with oppositely-projecting wings o' , and o^2 , the latter being in a horizontal plane slightly below that of the former, in order that these wings may lap past the wings on the adjoining spring,

in substantially the same manner as in the preferred form of pressure-spring.

In operation, when traveling over a rough roadway the portion of the tire and rim coming in contact with the ground will yield when striking an obstruction, and the plungers supporting said yielding portion will be forced longitudinally into their cylinders until the air therein has been so compressed that their further movement is prevented. As the air is compressed by the inwardly moving plungers, an equal amount of pressure is exerted in the cylinders of the remaining spokes and the outward force exerted against their respective plungers is sufficient to keep the remainder of the rim of the wheel within the maximum diameters thereof. In order to fill the air-passage with compressed air, I provide a suitable valve N, preferably of the pneumatic-tire type of outward pressure valves, that communicates with said air-passage, and which is adapted to be operated by means of an ordinary inflation-pump.

What I claim as new is:—

1. In a wheel, a rim comprising segmental sections one end of each of which has sliding connection with the adjoining section, a bolt passing through said sections and anti-friction rollers disposed transversely between said sections and bolt.

2. In a wheel, a rim comprising segmental sections pivotally jointed together and one end of each section being provided with an eccentric slot in which the pivot of the adjoining section operates, and anti-friction rollers disposed transversely between said sections and the pivotal bolt thereof.

3. A wheel comprising a hub, pneumatically cushioned spokes radiating therefrom and a rim consisting of several segmental sections connected together and having anti-frictional rollers surrounding their pivot, said sections articulating with said spokes at points off-set from the connections between said sections, and an eccentric slot in one end of each section in which the pivot of the adjoining section and said rollers operates.

4. A wheel comprising a hub having an air-passage therein, spokes each consisting of cylinder and piston members telescopically arranged, a flexible packing on the inner end of said piston, and springs having lateral wings pressing laterally against said packing.

5. A wheel comprising a hub having an air-passage therein, spokes each consisting of cylinder and piston members telescopically arranged, a flexible packing on the inner end of said piston, and substantially L-shaped springs pressing laterally against said packing.

6. A wheel comprising a hub having an air-passage therein, spokes each consisting

of cylinder and piston members telescopically arranged, a flexible packing on the inner end of said piston, and springs having oppositely disposed lateral wings pressing laterally against said packing.

7. A wheel comprising a hub having an air-passage therein, spokes each consisting of cylinder and piston members telescopically arranged, a coiled spring pressing outwardly against the inner end of said piston, a flexible packing on the inner end of said piston, springs pressing laterally against said packing, and a shield disposed between said last mentioned springs and said coiled-spring.

8. In a wheel, a rim comprising segmental overlapping sections, and means for joining the ends thereof together comprising a headed pivotal bolt, anti-frictional rollers surrounding said bolt and concavo-convex compressible washers interposed between the head and nut of said bolt and said sections.

9. In a wheel, a rim comprising segmental sections, one end of each of which has sliding connection with the adjoining section, and means covering the opening between the interlocking sections.

10. In a wheel, a rim comprising segmental sections, one end of each of which has sliding connection with the adjoining section, and a spring-plate closing the opening between the interlocking sections.

11. In a wheel, a rim comprising segmental sections, one end of each of which has sliding connection with the adjoining section and a spring plate at one end of each section that covers the opening between the interlocking sections.

In witness whereof I have hereunto set my hand this 28 day of Dec., A. D. 1909.

ARTHUR H. THIBAUT.

Witnesses:

ERNEST A. BROWNE,
GROVER C. APPLETON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."