T. WEAVER.

Carriage-Wheels.

No. 153,207. Patented July 21, 1874.

Fig. 1.

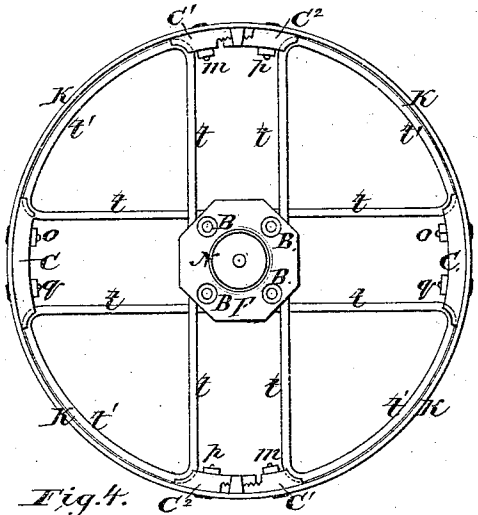


Fig. 2.

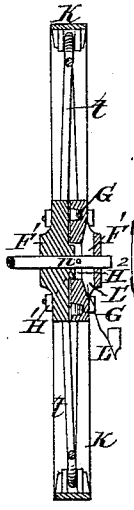


Fig. 3.

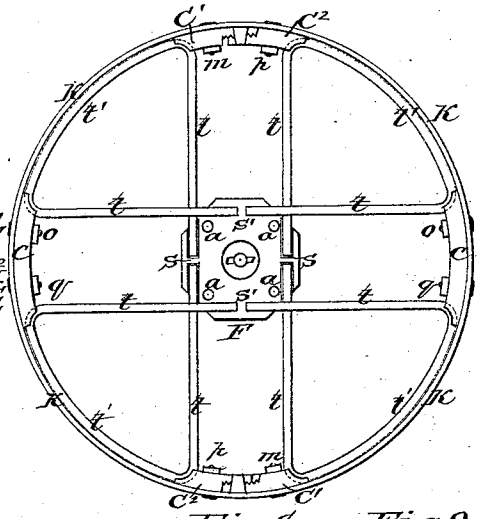


Fig. 4.

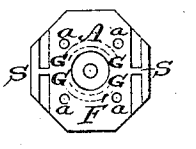


Fig. 5.

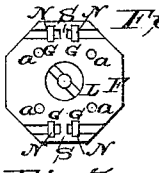


Fig. 15.

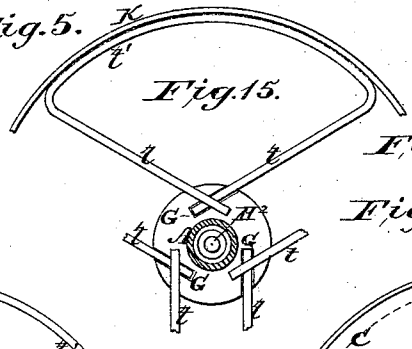


Fig. 8.

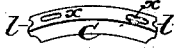


Fig. 9.

Fig. 10.

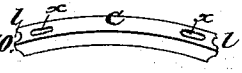


Fig. 11.

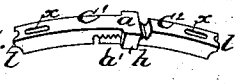


Fig. 6.

Fig. 7.

Fig. 12.

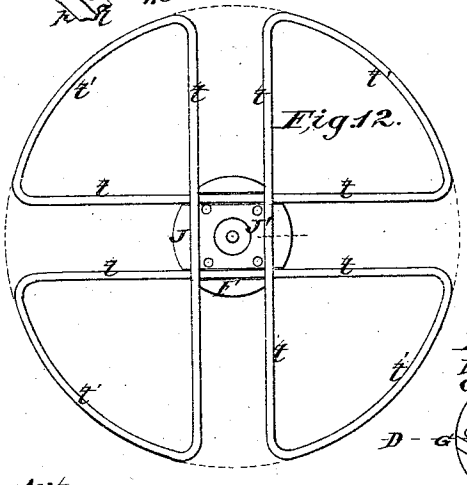


Fig. 13.

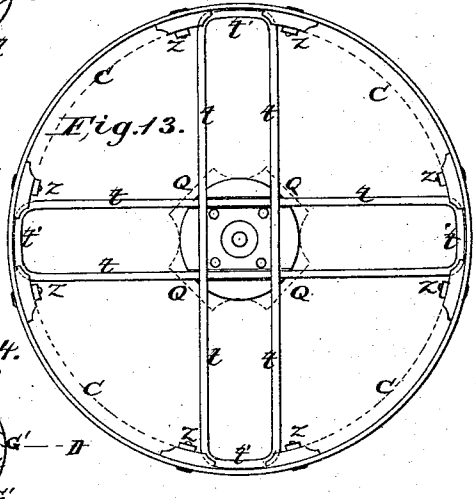
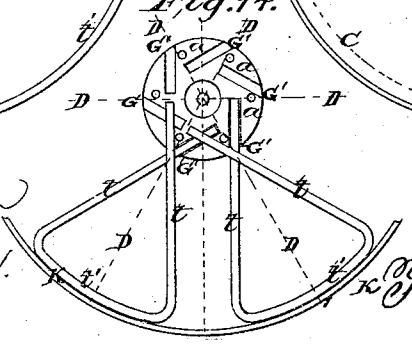


Fig. 14.



Witnesses.

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John Ferguson.

Inventor:

Theophilus Weaver.

UNITED STATES PATENT OFFICE.

THEOPHILUS WEAVER, OF HARRISBURG, PENNSYLVANIA.

IMPROVEMENT IN CARRIAGE-WHEELS.

Specification forming part of Letters Patent No. **153,207**, dated July 21, 1874; application filed September 5, 1873.

To all whom it may concern:

Be it known that I, THEOPHILUS WEAVER, of the city of Harrisburg, county of Dauphin and State of Pennsylvania, have invented an Improved Wheel for Vehicles, Carriages, or other conveyances, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings making a part of this specification.

My improved wheel is a metallic structure, and the following are its principal features:

First, a vertically, two-parted hub, having a linchpin chamber in its body, closed against the ingress of dust and the egress of the lubricant; second, a peculiar arrangement of the linchpin, inserted in a regular cylindrical axle, and rendered accessible only in a reliable way, to avoid accidental detachment; third, an eccentric arrangement of trenches in the hub-plates for the retention of the spoke substitutes, staggered wholly across the hub-parting line alternately; fourth, certain modifications in the interior termini of the trenches by transverse cleating or offsetting across the hub-parting line, to form rests for the support of the stub ends of the spoke substitutes, in wheels built with reference to stability; fifth, certain modifications in the loops or spoke substitutes, by which two or more are formed into congeries by the run of the uncut stuff or rod of which they are made, and certain thorough-trenches in which their straight limbs are admitted through the hub as stretchers, in wheels built with reference to elasticity; sixth, a cruciform or cross-trussed arrangement of the limbs of the loops, by which they are made to re-enforce each other, and by which they are less easily extracted from their places in the trenches, in rigid wheels; seventh, a plan of re-crossing and meshing the limbs of the loops, exteriorly to and in the hub, near its periphery, to enhance the stability of the wheel; eighth, a peculiar felly substitute and loop arrangement, by various subdivisions, to fill the tire; ninth, a complement of tire-liners or felly substitutes, bolted to the tire through oblong holes, to allow shifting in the intervening spaces, between the exterior of the knees of the loops; tenth, a peculiar construction of the ends of the tire liners, to embrace the knees of the loops and to hug the tire; eleventh, a complement of compound liners, or adjustable two-parted felly substitutes, peculiarly joined, to adapt themselves to limited irregularities of the frames composing the wheel; twelfth, a modification in the length of the tire-liners and loop-crowns relatively to each other, to complement conjointly the subdivisions of quadrantal, tri-looped, sextuple, or other plan of division.

In the accompanying drawings, Figure 1 is a front view of my wheel, on quadrantal plan. Fig. 2 shows a vertical bisection of the same. Fig. 3 is a front view of the same, with one of the octagonal hub plates removed. Figs. 4 and 5 represent the hub-sections or plates. Figs. 6 and 7 represent the parts of the compound liner, bed, and follower, respectively. Fig. 8 represents the simple tire-liner. Fig. 9 represents a dwarfed liner or knee-piece. Figs. 10 and 11 represent the simple and the compound tire-liners respectively, modified for complemental loops. Fig. 12 represents a congeries of four quadrantal loops, arranged on the hub. Fig. 13 represents two congeries, each formed by two complemental loops. Fig. 14 represents a plan of a sextuple wheel. Fig. 15 represents a plan of a tri-looped wheel.

My improved wheel-hub is vertically two-parted near the middle of its body. The male section F′ is applied to the female section F, as shown in Figs. 1 and 2, and they are in form or plan as shown in Figs. 4, 5, 12, 13, 14, and 15. B B B B, the connecting-bolts, are inserted, as indicated, in holes *a*. The male section F′ has centrally raised on its disk an inner hub, H^1; and the female section F has a central cavity about the bore for the axle, to admit part way the hub H^1 into it; and, when admitted fully, to leave an unfilled chamber, H^2, in which the horizontally-inserted linchpin *n*, made headless or stub-form, travels and transversely fills, to locate the wheel both ways on the axle without butt, boss, or other irregularity thereon requiring lathe-work. The linchpin chamber H^2 is a lubricant-holder, and may be made oil-tight by leaded joints, or by filling an annular groove, A, about the chamber H^2 with rubber or felt, as shown in Fig. 4. Provision is made to detach the wheel

from the axle in a way that may preclude accidental detachment. The port-holes L′ are made through the section F, containing the chamber, as shown in Fig. 2, by which the linchpin is accessible for its removal only when they are opened. The port-holes are securely closed, when the wheel is in use, by blocks L, Fig. 2, fitting the port-holes. The blocks are held in their seats by nuts of the hub-connecting bolts B stepping on the outer ends of the blocks. The removal of the linchpin is thus made contingent upon the removal of the nuts of the connecting-bolts B. The port-holes are made to open away from the axle-bearing sufficiently to leave the bearing and plate unimpaired in strength, and the inner ends of blocks conform to the plane of bottom wall of the chamber H^2. The inner hub H^1 is projected into the cavity of the opposite plate only sufficiently to rightly impose the plates, and assist the connecting-bolts. The contour or periphery of the hub may be polygonal or circular. In Fig. 13 the hub has bastions or fronts Q projected into the fields of the loops to strengthen their limbs.

In wheels built on plans of hexagons the hubs may be star-form; on plans of triangles, the hub may also be star-form, with alternate points foreshortened; on plans of octagons, the hub may be circular or octagonal.

The hub-sections F F′ are similarly channeled on their inner faces by semi-oval trenches G, directed parallel to the plane of the faces, and in the imaginary chord-lines of the wheel-circle, and corresponding in number with the number of subdivisions of the wheel by the loop-form or returned-spoke substitutes *t t′ t*, whose straight limbs or extensions are aligned in the chord-lines of the wheel, and are either stopped midway in the hub by their stub ends against cross-cleatings S in the middle of thorough-trenches, as shown in Figs. 3, 4, and 5, or by the ends of diverted trenches, as shown in Figs. 14, and 15, in wheels built only with reference to rigidity or stability. The diverted trenches are so named because they are offsetted, midway in the chord-line, to lie in the balance of the chord-line in the opposite hub-section. They are offsetted to stagger the loop-limbs alternately across the hub-parting line, and lie wholly either fore or aft from said line, as shown in Fig. 2.

The staggering of the loop-limbs is effected either by setting one limb of each loop on each side of said line, or by setting alternate pairs of limbs alternately across the line. The former plan applies to cross-trussed limbs, the latter to direct or parallel limbs of loops or to complimental loops; the object being to have the limbs, after insertion, run in a series around the hub alternately oppositely staggered, as shown in Figs. 1, 2, 3, 12, 13, 14, and 15, and crossed, also, by insertion or construction.

In quadrantal wheels the trenches G are parallel to each other in the same hub-section, and at right angles to each other relative to the opposite hub-section. In sextuple and tri-looped wheels the trenches G, as shown in Figs. 14 and 15 respectively, are parallel in relation to those complimenting them in the opposite section, and are directed to those adjacently in the same hub-section, so as to be inclined toward them at an angle of about sixty degrees. The trenches are all located in the perpendicular direction to the radius of the wheel, and more or less distant from its center, the stability of the wheel being indirectly as the eccentricity of the trenches, and the elasticity being directly as said quantity, as the points where the limbs cross each other will be more or less remote from the wheel-center, according to the eccentricity in any given subdivision of the wheel.

The limbs of the loops are designed to fill the trenches flush with the face of section in which they are located, so that they may be tightly held in place on joining the sections. Sheet-rubber blocks or leather cuttings may be lodged in pockets N, Fig. 5, in the troughs of the trenches, to add tightness of insertion, and to avoid precision of castings and gage of stuff.

The trenches G, represented as cross-cleated, or, which is the same, offsetted midway into the opposite hub-section, are designed to be so made only for wheels built with reference to stability. They are directed eccentrically, that they may, when desired, thorough-trench the hub-plates clear of the axle and linchpin chamber, and thus adapt the hub as a species of rack, to hold one or more congeries of loops pliantly suspended in its body, as shown in Fig. 12, in which four quadrantal loops, *t t′ t*, connectedly formed by the run of the uncut stuff, form a congeries or frame which is inserted in the thorough-trenched hub, as shown, to make a yielding or elastic wheel. The congeries is closed by a weld at J, or its equivalent. The rods or straight parts of the congeries are allowed to slide in the hub as stretchers through it, and the hub itself, axle, and carriage-body, are thus caused to vibrate by a peculiar vertically-rocking motion when the wheel encounters an obstacle. Congeries of two or more loops may also be inserted in hubs trenched on the plan shown in Figs. 14 and 15, the stretchers being deflected to correspond with the offset of the trenches, which must be extended beyond the midway point of the hub sufficiently to accommodate the deflected part of the stretchers, to allow room for vibration. In Fig. 13 congeries composed of two complemental loops are shown.

The plan of the loops *t t′ t* is substantially the same, whether a greater or less number of them is employed to support the tire K.

They are made with a tire-supporting crown, t', and are returned roundly from the tire-curve, forming bended knees on the tire at the extremities of the crowns, and their straight limbs t t are prolonged to the middle of the chord-line in which they are directed, or they extend through its entire length to form the stretchers in the congeries. The loop-limbs are made to enter the hub cross-trussed or cruciform, the place of crossing occurring either inside or outside of the hub-periphery, or inside and outside of said line, according to the purpose of the wheel. Said limbs are thus cross-trussed that they may resist extraction from the hub in rigid wheels, and that they may assume resistances to the wheel responsively or re-enforcedly.

In Fig. 14 the limbs of the same loop are shown crossed exteriorly to the hub, and the opposite limbs of adjacent loops are crossed or meshed inside the hub, thus slurring the loops to more effectively prevent extraction. A similar arrangement will apply to tri-looped and other wheels.

The object of the loops is not only to serve as spoke substitutes, but also as felly-segments. Their crowns are designed, ordinarily, to occupy the major subdivisions of the tire-concave, but may occupy the complements of the same, as shown in Fig. 13, as the crowns and tire-liners may exchange places, but not offices. The intervening parts of the tire-concave between the crowns of the loops are occupied by the said tire-liners, as shown at C C^1 C^2, Figs. 1, 3, and 13, or they are partially occupied by the fragmentary liners or knee-pieces, as shown at Z, Fig. 13.

The tire-liners are simple, as shown in Figs. 8 and 10, or they are compound, as shown in Figs. 6, 7, and 11. Like kinds are paired oppositely on the wheel, and not more than one pair of the compound liners are needed on the wheel. In both forms of the liners their ends are provided with semi-oval bearings or curved flutes l to fit against the outside curves of the knees of the loops, which are admitted sufficiently into the fluted ends to detain them laterally thereon, and to rest the liners as on abutments to arch said intervening spaces. The liners are provided with oblong holes X to admit ordinary tire-bolts, by which the liners are joined adjustably to the tire. They are joined adjustably to avoid exact spacing of the bolt-holes in the tire and exact placing of the loops' crowns, which are loosely sprung to line the complement of the tire-concave. The simple liners are arched bars of suitable length to span the average length of said intervening spaces, and are shorter for quadrantal, tri-looped, or sextuple-looped wheels than in wheels where they occupy the long complemental spaces, and the compound liners are long or short for the same reason. The knee-pieces Z, shown in Figs. 9 and 13, are the end sections of simple liners. The short liners or knee-pieces are employed to favor lightness of structure, and the liners to favor strong support for the tire.

The compound liners consist each of two parts, a bed, C^1, and a follower, C^2, shown in Figs. 6 and 7, respectively, which are applied to each other as shown in Fig. 11. They are adapted to be lengthened or shortened by adjustment of a ratchet-faced lap-joint about the middle of each liner. The bed C^1 is provided with the ratchet-faced retreat d, terminating between two guards, h, formed on the sides thereof, to keep the follower aligned on the bed. The ratchet-teeth are set edge foremost that they may bite into each other relatively to resist strain upon the ends of the liner. The parts are set to bite properly before the tire-bolts are tightened, by forcing the joints apart, and when the said bolts are tightened they persistently maintain their bite.

I claim—

1. The combination of the male section F' of the hub, provided with the boss H^1, and the female section F, provided with the circular cavity in its center to form the closed linchpin chamber H^2, the inner faces of said sections being trenched for the admission of the spoke substitutes, substantially as and for the purpose set forth.

2. The stub linchpin n, inserted horizontally through the axle, in combination with the hub-sections F and F', substantially as and for the purpose set forth.

3. The eccentric trenches G in the hub sections F F', for the admission and retention of the loop-limbs t t, all combined substantially as set forth.

4. The blocks L, in combination with the chambered hub-section F, for the purpose set forth.

5. The loops t t' t, provided with the tire-lining crowns t' and limbs t t, combined with the hub-sections, substantially as and for the purpose set forth.

6. The combination of loops t t' t, to form the compound loops, in the manner set forth.

7. The combination of two limbs, t t, of adjacent loops t t' t, to secure them in cross-trussed position in the hub, in manner set forth.

8. The combination of loop-crowns t' and tire-liners C and C^1 C^2, to fill the compass of the tire K, arch form, in the manner shown.

9. The loop-crowns t', in combination with the knee-pieces Z, by which the tire is supported only at regular intervals in light elastic structures, in the manner herein set forth and described.

10. The curved and fluted ends l of the liners, in combination with the knees of the loops t t' t, for the purpose herein set forth.

11. The combination-liner, composed of the bed C^1 and the follower C^2, these parts being constructed and applied to each other adjust-

ably, substantially in the manner as and for the purpose herein set forth.

12. The liners C and C^1 C^2, simple or compound, when provided with oblong bolt-holes X, to allow of limited shifting on the concave of the tire K prior to their fixed attachment, for the purpose herein set forth and described.

In testimony that I claim the foregoing as my invention, I have hereunto set my hand this 30th day of August, 1873.

THEOPHILUS WEAVER.

Witnesses:

DANIEL A. KEPNER,

JOHN FERGUSON.