

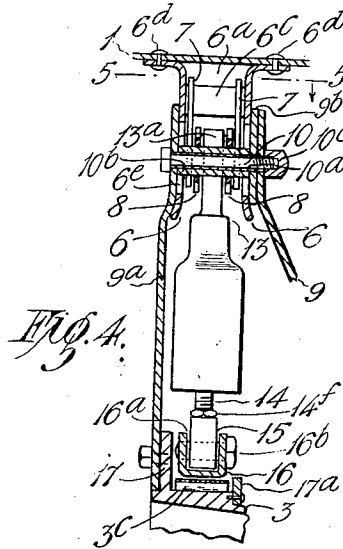
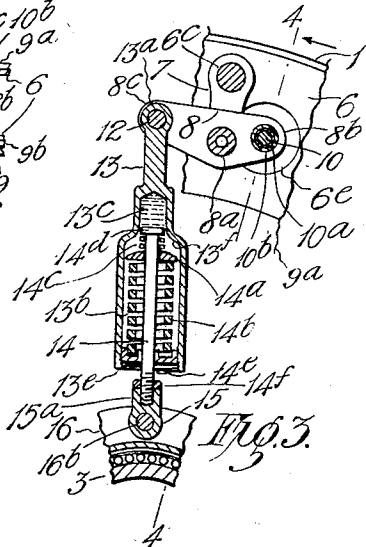
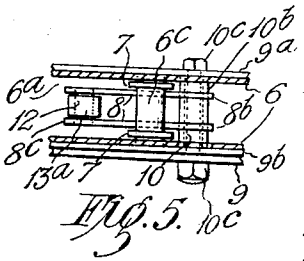
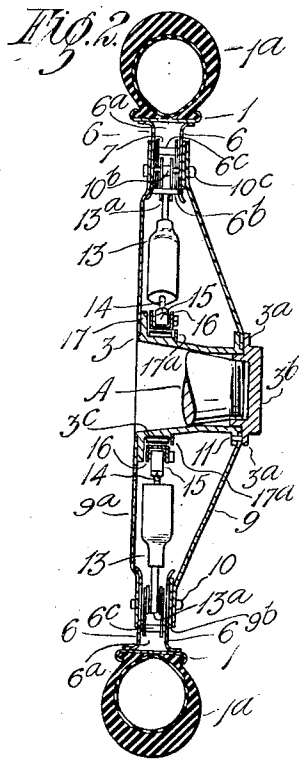
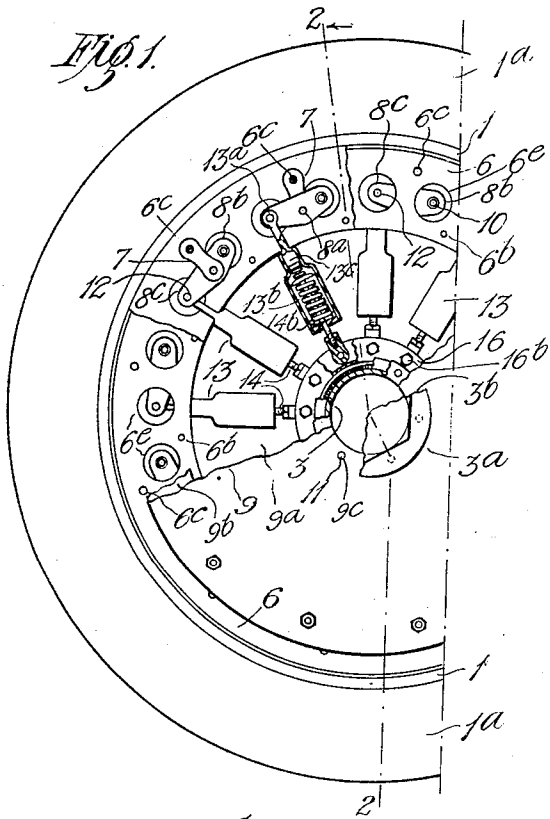
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T. L. COURTNEY

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SHOCK ABSORBING ROAD WHEEL OF VEHICLES

Filed May 14, 1930



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# UNITED STATES PATENT OFFICE

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## SHOCK ABSORBING ROAD WHEEL OF VEHICLES

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This invention relates to that class of road wheel which is suitable for automobiles, and which has means to absorb road shocks to a considerable extent. One object of the invention is to provide a wheel adapted to carry either a solid or a pneumatic tyre, and in which there are improved suspension devices comprising shock absorbing connections including spokes having components which are easy to keep in order. My construction prevents permanent dislocations of the positions of the wheel elements occurring as the result of severe stresses.

Extending inwardly from any suitable wheel rim I provide flanges having a circular channel between them, the flanges having also spaced apart apertures through which transverse pins extend, there being fulcrumed, on these pins, ends of levers which connect with spokes. The channel is bridged by transverse pins spaced a suitable distance apart, and such pins act as pivots of series of thrust links, which are provided in pairs. Each pair of links at its inner end is connected by a transverse pin which extends through the intermediate parts of a pair of the aforesaid levers. Each pair of levers acts as one. Each lever fulcrum pin aforesaid is secured at its ends to, respectively, an inner and an outer disc, the disc centres being secured to the wheel hub. The end of each lever remote from the fulcrum pin is pivoted to the outer end of a spoke member, the other end of which is recessed, and contains means which cause the spoke to vary in length under the influence of road shocks. These means comprise springs which act upon spoke rods, the inner end of each of which is pivotally connected to a ring which is loose around the wheel hub.

This invention is further described hereinafter, and will be understood fully by the aid of the accompanying drawings. The details illustrated may, however, be varied in minor or obvious respects while retaining matter hereinafter claimed. I do not, for example, illustrate lubricating devices which would be used in practice.

Figure 1 is a side elevation of part of my

wheel, of which parts are broken away and other parts are shown in section.

Figure 2 shows the wheel in vertical section on line 2—2 of Figure 1.

Figures 3 to 5 are on a larger scale.

Figure 3 is a sectional elevation of a spoke and its connection to the rim and to the ring round the hub.

Figure 4 is a transverse section on line 4—4 of Figure 3.

Figure 5 is a sectional plan on line 5—5 of Figure 4.

1 is a wheel rim, shown of fixed type by way of example, and 1<sup>a</sup> is a tyre—but a solid tyre can be substituted for the pneumatic tyre shown,—and 3 represents any suitable hub.

Extending inwardly from rim 1 are flanges which are conveniently formed by two rings 6, which are spaced apart, forming sides of a circular channel 6<sup>a</sup>; and to keep them the correct distance apart I employ transverse pins or stays 6<sup>b</sup> and 6<sup>c</sup>, the flanges being riveted on the rim at 6<sup>d</sup>, or being welded in position. To provide clearance spaces for movements of local parts, apertures 6<sup>e</sup> are shown in the flanges, the diameter of the apertures considerably exceeding that of transverse pins hereinafter mentioned.

The apertures are spaced apart around the flanges and each pin 10 extends at each end through one of the apertures, and projects outside a flange, where it engages a connection which extends to the wheel hub 3. These connections are shown as an outer disc 9 and an inner disc 9<sup>a</sup>. Apertures 6<sup>e</sup> not only have their edges always out of contact with pins 10 and their coverings; they also afford means of access to parts of my mechanism located within the channel. Each pin 10 is sheathed by a wear sleeve 10<sup>a</sup>, within a disc spacing ferrule 10<sup>b</sup>, which keeps the discs a fixed distance apart.

Disc 9 has near its inner edge, a series of holes 9<sup>c</sup> spaced apart and engaged by studs 11 projecting from the wheel hub the disc edge being behind the rim 3<sup>a</sup> of the hub cap 3<sup>b</sup> which is suitably mounted on the wheel axle A. The disc 9 extends from the

outer flange 6 obliquely to the wheel hub, and assists the wheel tyre and rim to resist any tendency to become displaced laterally as the result of stresses occurring while the wheel is running.

The outer edges of discs 9 and 9<sup>a</sup> are kept in position by heads or enlargements 10<sup>c</sup> on pins 10; and to keep the latter in position when the disc 9 is removed, there is a ring gasket 9<sup>b</sup> inward of disc 9.

Each pin 6<sup>c</sup> has a thrusting effect and, with the wheel rim, moves in directions appropriate to the various shocks to which the tyre, rim, and flanges are subjected. On each pin 6<sup>c</sup> is mounted the outer ends of a pair of thrust links 7 which are spaced apart, each within channel 6<sup>a</sup>, and each extending towards the wheel hub.

Joining each of these thrust links is a transverse pin 8<sup>a</sup> which, between the said links (see Figure 5) passes through holes in a pair of spaced apart levers 8, each fulcrumed at one end 8<sup>b</sup> on an aforesaid pin 10, but each moved by the thrust of an aforesaid pin 8<sup>a</sup>.

Each pair of levers acts as one; at its end 8<sup>c</sup> remote from its fulcrum, each is pivoted by a pin 12 to the outer end 13<sup>a</sup> of a spoke 13 which moves according to the lever movement. The distance between pin 8<sup>a</sup> and pin 10 is slightly shorter than that between pin 8<sup>a</sup> and pin 12.

Each spoke has any suitable details, with its middle part recessed. Entering each recess 13<sup>b</sup> is a spoke bar 14, the end of which near the hub connects with a swing head 15 shown as a socket member connected to a ring 16 which freely surrounds wheel hub 3, and is referred to hereinafter as a floating ring.

Antifriction devices are provided comprising roller bearings 3<sup>c</sup> between the ring 16 and the hub 3. The spoke bar 14 carries a partitioning washer 14<sup>a</sup> as an abutment between a strong coiled spring 14<sup>b</sup> and a lesser spring, one of washer type 14<sup>c</sup> being suitable. Spoke bar 14 has a head 14<sup>d</sup> which acts as an abutment for spring 14<sup>c</sup>.

The recess 13<sup>b</sup> has a removable and adjustable cap 13<sup>c</sup> which in addition to keeping dirt out, acts as an abutment of spring 14<sup>b</sup>, and also tensions it to enable it to function suitably.

A space 13<sup>c</sup> at the inner end of recess 13<sup>b</sup> is filled with a jelly-like lubricant matter which keeps in place partly owing to the centrifugal force which develops during wheel travel. This matter being in contact with head 14<sup>d</sup>, somewhat retards movement of the spoke in the direction of space 13<sup>c</sup>.

Washer 14<sup>a</sup> is shown clear of a shoulder 13<sup>c</sup> in the recess 13<sup>b</sup>. The washer position and the degree of compression of spring 14<sup>b</sup> are also regulated by the position given to a screw thread 14<sup>e</sup> in a socket 15<sup>a</sup> in the swing

head 15, the adjustment being maintained by for example a lock nut 14<sup>f</sup>.

The floating ring is of channelled cross section, its channel 16<sup>a</sup> receiving the inner ends of the swing heads 15, each said end being pivoted on a transverse bolt 16<sup>b</sup>. Ring 16 is prevented from displacement laterally inwardly by a flange 17 on hub 3 which also carries a shallow flange 17<sup>a</sup>, forming a shallow channel which ring 16 enters when the wheel is at rest and sustaining a load.

When the vehicle is at rest, the wheel hub rests on the lower part of bearing 3<sup>c</sup> within the floating ring. That bearing facilitates starting and functions advantageously during travel at low speed. Assuming the wheel then strikes an obstacle and receives a shock, the latter is transmitted by means of pins 6<sup>c</sup> and thrust links 7 to pin 8<sup>a</sup>, causing each lever 8 to swing on its pivot 10—see Figure 3—and, through pin 12, actuate spoke bar 13, the return movement of the parts being however damped by spring 14<sup>b</sup>. But, in addition to the said effects, the existence of the series of members 7, 8, 12, and 13 spaced around the wheel, particularly such as are diametrically opposite those receiving the primary shock, modifies the effects, and to some extent opposes and limits them. Each primary shock is therefore distributed, and only relatively slight shocks reach hub 3 and the vehicle axle.

I claim:—

1. A shock absorbing wheel having a rim, spaced apart members extending from the rim towards the hub, spaced apart pins connecting said members, thrust links pivoted on said pins and extending towards the hub, supporting pins carried by the thrust links, levers on said supporting pins, fulcrum pins at ends of the levers, discs carrying said fulcrum pins and extending to the wheel hub, a ring loosely enclosing the hub between said discs, and spring controlled spokes of variable length connecting the ring and the said levers.

2. A shock absorbing wheel having fixed to each side of its hub a disc, spaced apart pins connecting the disc peripheries, levers each having one end mounted on one of said pins, a connection from each lever to the wheel rim, and at the other end of each lever a connection to a spoke of variable length, a spring device to control variation of said length as the result of wheel shock, a floating ring surrounding the hub, and a connection of each spoke to said ring.

3. A shock absorbing wheel having a hub, a channelled floating ring surrounding said hub, anti friction devices between said hub and said ring, spokes pivoted in said ring channel, means in each spoke to vary its length as the result of wheel shock, levers each pinned at one end to a spoke, connec-

tions from said levers to the wheel rim, fulcrum pins at the lever ends remote from the spokes, and discs holding the fulcrum pins and extending to the hub.

5 In testimony whereof I affix my signature.

THOMAS LEE COURTNEY.

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