S. HIPKINS.

RESILIENT WHEEL.

APPLICATION FILED AUG. 30, 1911.

1,054,118.

Patented Feb. 25, 1913.

2 SHEETS—SHEET 1.

Fig. 1

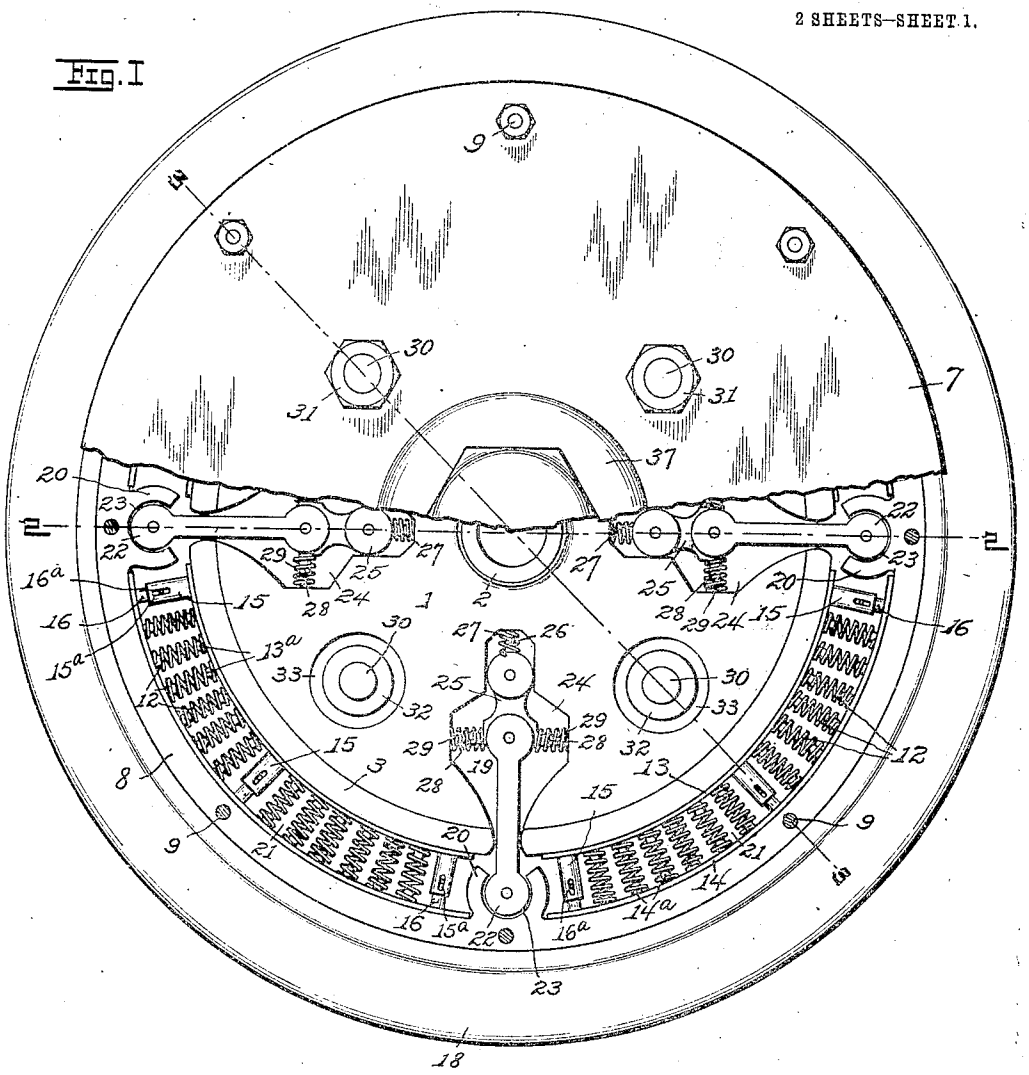

Fig. 2

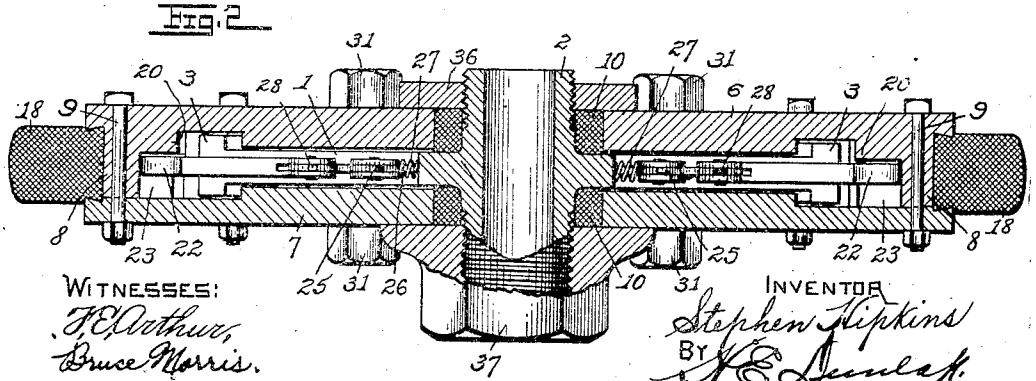

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Fig. 3

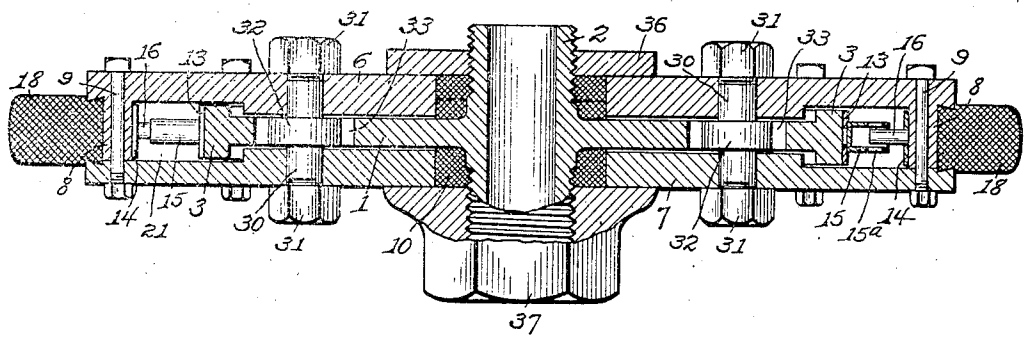


Fig. 4

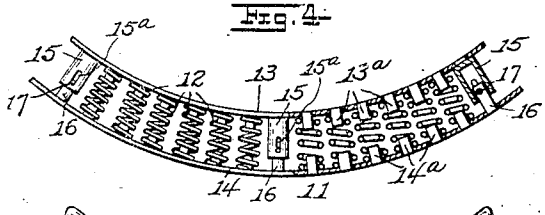


Fig. 4a

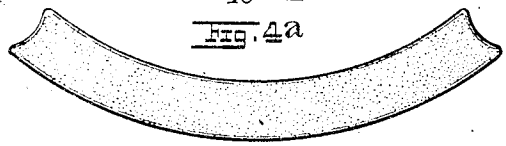


Fig. 5

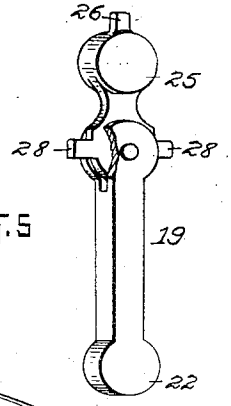


Fig. 6

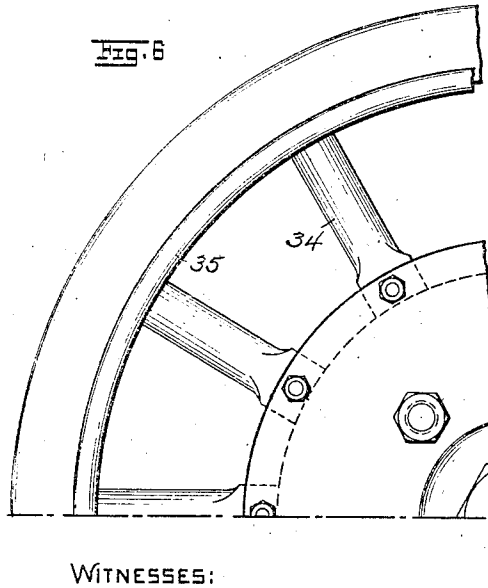
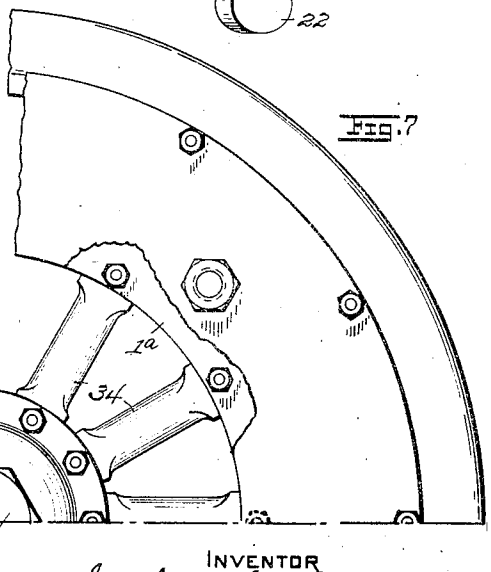


Fig. 7



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RESILIENT WHEEL.

1,054,118. Specification of Letters Patent. Patented Feb. 25, 1913.

Application filed August 30, 1911. Serial No. 646,869.

To all whom it may concern:

Be it known that I, STEPHEN HIPKINS, a citizen of the United States of America, and resident of Martins Ferry, county of Belmont, and State of Ohio, have invented certain new and useful Improvements in Resilient Wheels, of which the following is a specification.

This invention relates broadly to wheels, and specifically to a resilient wheel for vehicles.

The primary object of the invention is to provide a strong and durable wheel for vehicles whereby road shocks will be effectively absorbed and to a considerable extent prevented from being communicated to the vehicle supported on such wheels.

A further object is to provide a wheel wherein a maximum amount of resiliency is attained with but slight sacrifice in simplicity.

With these and other objects in view, the invention consists in the features of construction, arrangement of elements and combinations of parts which will hereinafter be fully described, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a view of the invention partly in section and partly in side elevation; Fig. 2 is a cross section on the line 2—2, Fig. 1; Fig. 3 is a cross section on the line 3—3, Fig. 1; Fig. 4 is a view of a spring segment partly in section and partly in side elevation; Fig. 4ª is a side elevation of a segment formed of rubber or like flexible material; Fig. 5 is a perspective view, partly in broken section, of an equalizing lever; and Figs. 6 and 7 are views showing modifications wherein spokes are employed.

Referring to said drawings, in which like designating characters distinguish like parts throughout the several views 1 indicates a circular plate or disk formed integral and concentric with a hub 2 adapted to be received on the spindle of a vehicle-axle. A flanged rim 3 is formed on the periphery of said disk 1. Fitted against the opposite faces of said disk 1 are plates 6 and 7 of greater diameter than the said disk, both having their inner faces offset to receive the rim 3 of said disk. Formed on the inner face of the plate 6 adjacent to its edge is an integral circular flange 8 against the edge of which the plate 7 seats and through which securing bolts 9 are directed at intervals for binding said plates together in fixed relation, as is clearly shown in Fig. 3. Each of the plates 6 and 7 has a centrally located hole therein through which the hub 2 projects, the diameter of said holes being considerably greater than that of said hub, spaces being thus provided for the reception of a suitable soft or pliable packing 10.

Interposed between the rim 3 of the disk 1 and the flange 8 is a plurality of yieldable segments, designated generally by the numeral 11. While said segments may be of rubber or like pliable, yielding material, as shown in Fig. 4ª, I prefer to employ a plurality of small coil springs 12 in the construction of each segment, as shown in Figs. 1 and 4. In the preferred embodiment the segment comprises two arcuately curved metal plates 13 and 14 adapted respectively to rest against said rim 3 and said flange 8. Oppositely disposed studs 13ª and 14ª project from said metal plates and are adapted to receive thereon the opposite ends of said springs. As a means of preventing creeping of said plates with respect to each other, one or more tubular sleeves 15 are projected from one of said plates toward the other and receives therein a pin or stud 16 projected from the other of said plates. For preventing the plates from being accidentally disconnected and the springs from dropping out when the segments are being handled, a hole 16ª is provided in the stud and a registering hole or slot 15ª is provided in the sleeve for the reception of a pin 17 for interlocking the parts. When the segment is mounted in position, said pins 17 are withdrawn to allow the parts to operate against the tension of the springs.

As is obvious, when the wheel is in use, the tire 18, which is carried on the peripheries of the plates 6 and 7 in any appropriate manner, supports said wheel; and, since said plates are more or less freely movable with respect to the hub 2 and disk 1, the weight of the latter and the weight of the vehicle sustained by said hub is successively borne by the yieldable segments as the wheel rotates. Auxiliary to said yieldable segments 11 is a plurality of radially disposed flexible levers, termed equalizing levers, designated generally by the numeral 19, said levers being disposed between adjacent ends of the segments 11, as shown in Fig. 1, and being designed primarily to admit of radial movement of the disk with respect to the plates

while preventing rotary movement of said disk with respect to said plates. A joint of substantially ball-and-socket type is had between each equalizing lever and the flange 8, the latter having socketed inwardly directed extensions 20 located at points between the spaces 21 in which the segments 11 are received. The substantially circular head 22 of a lever 19 is mounted in the socket 23 of an extension 20, and the body of said lever extends radially into an opening 24 of substantially diamond-shape provided in the disk 1. The inner end of the body of said lever is bifurcated and has pivotally mounted in the bifurcation one end of a rocker member 25 which normally stands in alinement with said body. Said member has formed integral therewith on its inner end an inwardly projecting arm 26 upon which is received one end of a coil spring 27 whose opposite end rests against the body of the disk at the innermost extremity of the opening 24. Oppositely directed lateral arms 28, also carried by said member 25, have received thereon the ends of coil springs 29 whose opposite ends rest against the body of the disk laterally of said opening 24.

As is obvious, a slight rocking movement of the body of the lever 19, induced by a like movement of the disk 1, is permitted by the construction described, said lever having a substantially pivotal movement in the socket 23; also, a further rocking movement of the member 25 is had at the pivotal connection of the latter with the body of the lever 19.

Means is provided for limiting the range of movement of the disk 1 with respect to the plates 6 and 7, said means comprising a plurality of bolts 30 directed through said parts and having nuts 31 threaded upon their projecting ends against the outer faces of said plates, as is most clearly shown in Fig. 3. Said bolts are firmly seated in said plates, and each preferably has an integral annular extension 32 intermediate its ends which lies between said plates in a hole 33 provided therefor in said disk, said hole having a considerably greater diameter than that of said extension 32.

In practice, the springs 12 of the segments 11 and the springs of the levers 19 serve as the supports for the weight of the vehicle borne by the disk 1, and act to absorb the shocks of the road, a limited amount of radial movement of said disk with respect to the plates being permitted.

In wheels of large size spokes 34 may be employed, if desired. The spokes may be disposed between the peripheries of the plates and a wheel felly 35, as shown in Fig. 6, or they may be disposed between the hub and the disk 1^a, as shown in Fig. 7. In the former case the spokes constitute a mere radial continuation or extension of the disk, while in the latter case the spokes have their inner ends bolted to the hub and their outer ends bolted to the inner edge of the disk 1^a.

Threaded upon the inner end of the hub 2 against the plate 6 is a plate or washer 36; and threaded upon the outer end of said hub against the plate 7 is a cap 37, said washer and cap being designed to retain in position the packing 10 and the lubricant employed within the wheel.

In the event that parts of the wheel should be broken or disarranged, or that it should become desirable to render the wheel solid or non-resilient, the packing 10 may be removed and one or more solid disk washers slipped into the space occupied by the packing.

While I have described my invention more or less in detail, it is apparent that various changes or alterations within the skill of a mechanic and within the scope of the appended claims may be resorted to without departing from the general spirit or scope of the invention; hence I do not desire to be understood as limiting myself to the precise construction and arrangement of parts herein shown and described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A resilient wheel comprising a hub, a circular disk in fixed relation to and concentric with said hub and having radially disposed openings therein, a flanged rim formed on the periphery of said disk, circular plates seated against the opposite faces of said disk and normally concentric with the latter, said plates having their adjacent faces offset for the reception of said flanged rim, a laterally directed flange carried by one of said plates adjacent to the periphery thereof and against which the opposite plate seats, said flange having sockets therein, a plurality of yieldable segments interposed between said flange and the rim of said disk, a plurality of radially directed equalizing levers each of which comprises a pair of normally alined pivotally connected members, the outer member having a head seated in one of said sockets and extending into one of the openings in the disk, and springs disposed on three sides of the other of said members.

2. A resilient wheel comprising a hub, a circular disk concentric with and in fixed relation to said hub and having substantially diamond-shaped radial openings therein, circular plates mounted on opposite sides of said disk and having their edges projected outward beyond the periphery of said disk, a laterally directed flange formed on the periphery of one of said plates and having sockets on its inner face, said flange being connected to the opposite

plate whereby the plates are rendered jointly movable with respect to said disk, means for limiting the range of radial movement of said plates with respect to said disk, yieldable means for cushioning the force of such movement, and auxiliary cushioning means embodying levers having their outer ends pivotally mounted in said sockets and extending into said radial openings, a spring in alinement with each lever and interposed between the inner end of the latter and a wall defining the end of the opening in the disk, and springs disposed between the opposite sides of the lever and the adjacent walls of the disk.

3. A resilient wheel comprising a hub, a circular disk concentric with and in fixed relation to said hub and having radial openings therein, circular plates mounted on opposite sides of said disk and having their edges projected outward beyond the periphery of said disk, a flange formed on one of said disks and rigidly connected to the latter, said plates being movable with respect to said disk, means for limiting the range of radial movement of said plates with respect to said disk, a plurality of segments embodying springs arranged to cushion such movement, and a plurality of radially disposed equalizing levers extending into said radial openings and arranged as auxiliary cushions between said plates and said disk, each lever comprising a member having its outer end pivotally held by said flange, a rocker pivoted to the inner end of said member, and springs interposed between said rocker and the adjacent walls defining the opening of the disk.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

STEPHEN HIPKINS.

Witnesses:
H. E. DUNLAP,
BRUCE MORRIS.