J. F. WILMOT.

WHEEL.

APPLICATION FILED FEB. 4, 1909.

1,037,699. Patented Sept. 3, 1912.

Fig. 1.

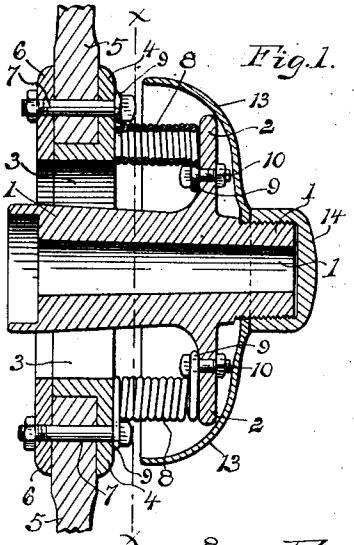


Fig. 2.

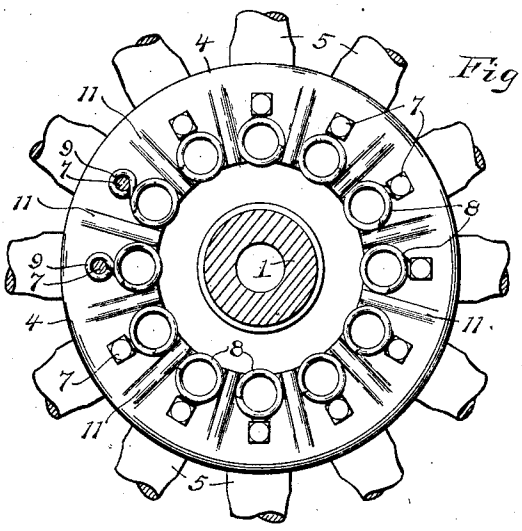


Fig. 3.

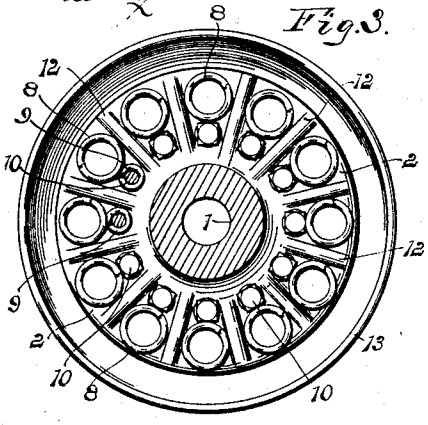


Fig. 4.

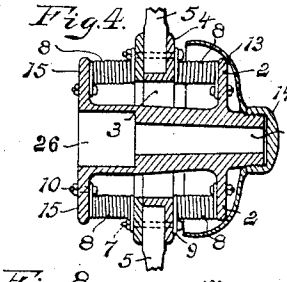


Fig. 7.

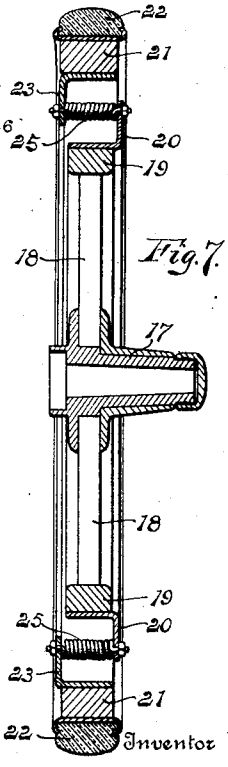


Fig. 8.

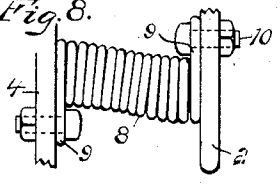


Fig. 5.

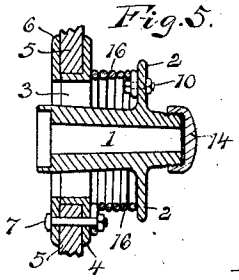


Fig. 6.

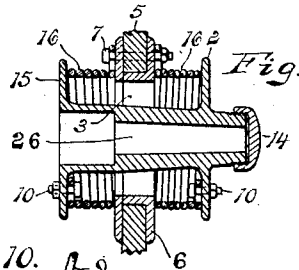
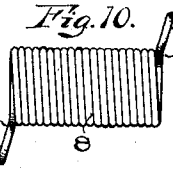


Fig. 9.

Fig. 10.



Witnesses

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WHEEL.

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Application filed February 4, 1909. Serial No. 475,986.

To all whom it may concern:

Be it known that I, JOHN F. WILMOT, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Wheels, of which the following is a specification.

This invention relates to an improved wheel of the class in which resilient members are employed to give resiliency to the wheel, and in which class of wheels, springs of many kinds have been variously arranged to yieldingly support the load. In these previous constructions, when the wheel is subjected to a load, the springs are put either under tension or compression and they are usually so arranged that only a portion of their number is acting at any time to carry the load, and when so put under tension or compression, the parts are subjected to heavy strains and a great amount of friction, causing breakage and wear and greatly lessening the resiliency of the wheel.

The object of this invention is to so construct a wheel of this class that friction of its parts is entirely eliminated, and that the resilient members will all carry an equal proportion of the load at all times.

A further object is to provide a construction in which there are no loose parts and where the springs are arranged to freely yield laterally under load and arranged to yield longitudinally under heavy side strain upon the wheel to eliminate shocks and jars occasioned thereby.

To this end the invention consists in constructing a wheel with an inner or hub member free to move relatively to an outer or rim member, and connecting these parts by a horizontally extending resilient member or members which are rigidly secured at their ends to said wheel members and support the hub member by the resistance to radial flexure only, said springs being arranged to yield longitudinally only upon side strain upon the wheel.

The invention further consists in certain other new and useful features and in the particular construction, arrangement, and combination of parts all as hereinafter more fully described, reference being had to the accompanying drawing, in which:

Figure 1 is a transverse section of a portion of a wheel embodying the invention. Fig. 2 is a section of the same on the line x—x of Fig. 1 when looking inward or toward the spokes of the wheel; Fig. 3 is a similar section on said line x—x looking in the opposite direction to that of Fig. 2; Figs. 4, 5, and 6 are vertical sections showing modified constructions; Fig. 7 is a vertical section through a complete wheel showing a further modified construction; Fig. 8 is a detail showing in side elevation one of the springs shown in Fig. 1, and illustrating the same as deflected laterally under load; Fig. 9 is an end elevation of the spring shown in Fig. 8; and Fig. 10 is a side elevation of the same showing the lateral bend in the loops.

In the construction shown in Figs. 1, 2, and 3 the wheel hub 1 is provided at a distance from its outer end with an outwardly extending circular flange 2. Surrounding this hub near its inner end, and of considerably greater diameter than the diameter of the hub, is a ring 3 provided with an outwardly extending integral flange 4 to engage the spokes 5 of the wheel at one side and a detachable flange 6 to engage the other side of the spokes, bolts 7 extending through the flanges and spokes to hold the latter firmly in place. The outer ends of the spokes may be provided with the ordinary felly or rim, not shown. 8 are springs preferably formed of coiled wire with the turns lying in contact with each other and each end of the wire of each spring formed into a reverse loop 9, the wire extending tangentially from the coil and bent in a direction opposite to that of the coil to form the loop. These loops are preferably bent laterally at 24 out of the plane of the end of the coil, as shown in Fig. 10, so that when the spring is secured to a flat surface by a bolt passing through the loop, and the loop drawn down against the surface thereby, the spring of the bend in the loop will hold the end turn of the coil firmly against the surface to which the spring is secured. The tangential arrangement of the loops obviates making a right angle bend in the wire and prevents breaking. A series of these springs 8 is secured to the outer surface of the flange 4 by the bolts 7 which are passed through the loops 9 on that end of the springs and by reason of the lateral bend 24 in the loops, firmly and rigidly hold the end turn of the coil against the flange, and the opposite ends of

the springs are in a like manner rigidly secured to the circular flange 2 on the hub 1 by means of the bolts 10 extending through the loops 9 on the outer ends of the springs and through said flange. The loops 9 are preferably arranged so that they extend in opposite directions from the ends of the springs, the loops on the inner ends of said springs when secured in place in the wheel, extending outward and those on the outer ends of said springs extending inward or toward the hub. By this arrangement the hub portion of the wheel is supported within the axis of the outer rim portion of the wheel, entirely by the horizontally extending springs and any weight upon the hub which tends to move the same radially within the surrounding ring 3 of the rim portion of the wheel, is supported by said springs and said movement resisted by the resistance of said springs to lateral flexure. As the springs are rigidly held at their ends, resiliency is secured not by the resistance of the springs to elongation, but by their resistance to lateral or radial flexure and no friction at the ends of the springs is caused by such movement. These springs yield laterally as readily in one direction as another and thus each supports its share of the weight at all times. To hold the springs from turning upon their bolts, radial ribs 11 are provided on the outer surface of the flange 4 and similar ribs 12 are provided on the inner face of the circular flange 2. These ribs space the coils apart, but do not hinder the ready removal of any one of the springs, which may be slipped out by taking out the bolts 7 and 10 and drawing the springs radially outward between the ribs. Any one of the springs may thus be quickly and easily detached and a new spring put in its place. Tightly coiled springs or springs with their turns lying in contact with each other are preferably used for the reason that when said springs are flexed laterally, the turns support each other and strengthen the spring. The springs and adjacent parts are partially protected from dust and dirt by a cap-like shield 13 adapted to fit over the end of the hub which is screw threaded and projects therethrough, and is held upon the hub by means of the ordinary cap 14. This shield may, however, be held in any suitable manner. The shield extends outward and inward toward the spokes, over the springs and their fastenings and forms a finish for the hub.

Fig. 4 shows a construction in which the hub 26 is extended inward and is provided with a flange 15 similar to the flange 2 on its outer end and a second series of springs 8 is secured between this flange 15 and the inner flange of the rim portion of the wheel. It is obvious that the springs at the outer side of the wheel may be omitted if desired.

Fig. 5 illustrates a construction in which a single, large heavy coiled spring 16 surrounds the hub and is secured at one end to the rim portion of the wheel and at its other end to the flange 2 of the hub. This single spring is of such a diameter that the hub may have a free radial movement therein.

In the construction shown in Fig. 6 the hub 26 is extended inward and flanged in a manner similar to that shown in Fig. 4 and a second single coiled spring 16 is secured between the inner flange 15 and the flange 6 of the rim portion of the wheel.

A wheel is illustrated in Fig. 7 having a hub 17 from which extend the radial spokes 18 provided on their outer ends with an inner rim 19 to which is secured an outwardly extending metal flange 20. An outer rim or felly 21 is provided with the ordinary tire 22 and with an inwardly extending flange 23, said flange 23 extending inward at one side of the wheel and the flange 20 extends outward at the opposite side of the wheel. Secured near the edges of these flanges and extending across between the same is a series of coiled springs 25, all arranged in a substantially horizontal position and rigidly secured at their ends to the flanges in any desired manner as by turning the ends of the wire forming the springs outward to engage openings in the flanges and screw-threading said ends to receive nuts engaging the outer surfaces of the flanges. As in the other constructions the springs thus form laterally yielding members connecting the outer rim portion of the wheel and the inner hub portion.

By arranging the coiled springs as described, they not only yieldingly support the load by their resistance to lateral flexure, but when any lateral strain is put upon the wheel, these springs will yield longitudinally and relieve the vehicle to which the wheel is attached from shocks and strains due to such side motion.

While I have shown and described the springs as being secured by means of the integral loops and the ends of the springs seated directly upon the flanges to which they are secured, I do not wish to limit myself to such construction as it is obvious that other means might be employed to secure the springs in place, and it is also apparent that other changes in the construction and arrangement of parts may be made without departing from the spirit of my invention.

Having thus fully described my invention what I claim is:

1. A wheel comprising an inner portion an outer portion, and coiled springs with their turns normally in contact with each other rigidly secured at one end to said

inner portion and at their opposite ends to the outer portion, said coils being supported at their annular end faces by said portions.

2. A wheel comprising inner and outer portions having overlapping parts provided with opposed faces forming spring seats, coiled springs extending horizontally between said overlapping parts and having their end coils seated upon said seats, and means for rigidly securing the ends of the springs to hold the end coils to their seats.

3. A wheel comprising a hub portion, an outer portion surrounding the hub portion, said portions having opposed parallel vertically extending surfaces, and resilient members extending between said surfaces in a horizontal position and each rigidly secured to and supported by said surfaces at its ends against flexure, whereby upon relative movement of said portions, said members are given a reverse curve flexure intermediate their ends.

4. A wheel comprising an inner portion, an outer portion, springs formed of coils of uniform diameter, said coils arranged to lie in contact with each other and extending horizontally between said wheel portions, means for securing said springs at one end to the inner wheel portion with the end coil supported at its periphery by said portion, and means for securing said springs at their opposite ends to the outer wheel portion with the end coil supported at its periphery by said portion.

5. A wheel comprising an inner portion, an outer portion coiled springs extending horizontally between said portions and each formed of a coiled wire with the ends of the wire extended laterally from and outside of the end turns of the coil and bent into a loop, and means engaging said loops to rigidly secure the same against the portions.

6. A wheel comprising an inner portion, an outer portion, springs extending horizontally between said portions formed of coiled wire with each end of said wire extended tangentially to the coil and bent into a reverse loop extending laterally from the end coil, and means for engaging said loops to rigidly and detachably secure the same to said outer and inner portions.

7. A wheel comprising an inner portion, an outer portion, springs each formed of coiled wire with each end of said wire formed into a loop extending laterally from the end turn of the coil and each loop bent laterally out of the plane of the end turn of the coil, and means engaging said loops and rigidly securing the same against the inner and outer portions with said end turns of the coils held seated upon said portions by the spring of the wire at the bend in said loops.

8. A wheel comprising a hub, an outwardly extending flange on said hub, an outer portion having a ring surrounding the hub, a series of horizontally extending coiled springs secured at one end to the ring and at their opposite ends to the flange on the hub, and radial members on said ring and flange to space and guide said springs.

9. A wheel comprising a hub, an outwardly extending circular flange on said hub, an outer portion having a ring surrounding the hub and spaced therefrom, a series of horizontally extending coiled springs detachably secured at their ends to said ring and flange, and radial ribs on said ring and flange between the springs to space the ends of the springs apart.

10. A wheel comprising a hub, an outwardly extending circular flange on said hub, an outer portion having a flanged ring surrounding the hub and spaced therefrom, a series of coiled springs extending horizontally between said ring and flange having loops at their ends, bolts passing through said loops and flange on the ring to rigidly secure the ends of said springs to said ring, and bolts passing through the loops on the other ends of the springs and through the flange on the hub to secure said ends thereto.

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

JOHN F. WILMOT.

Witnesses:
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G. E. MCGRANN.

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