W. F. DOLL.

RESILIENT WHEEL.

APPLICATION FILED JUNE 24, 1914.

1,136,869.

Patented Apr. 20, 1915.

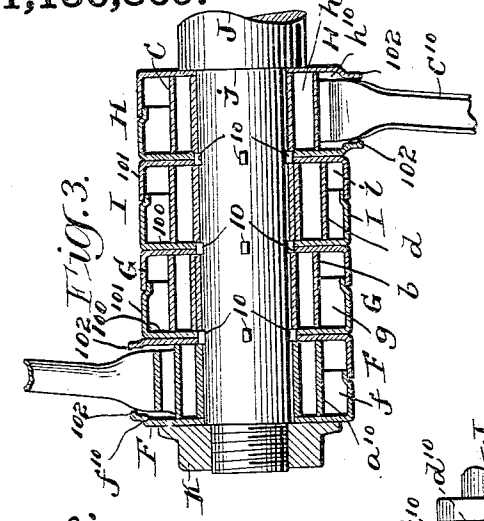

Fig. 3.

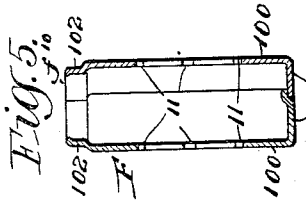

Fig. 5.

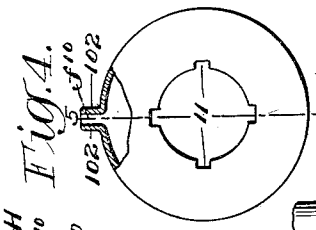

Fig. 4.

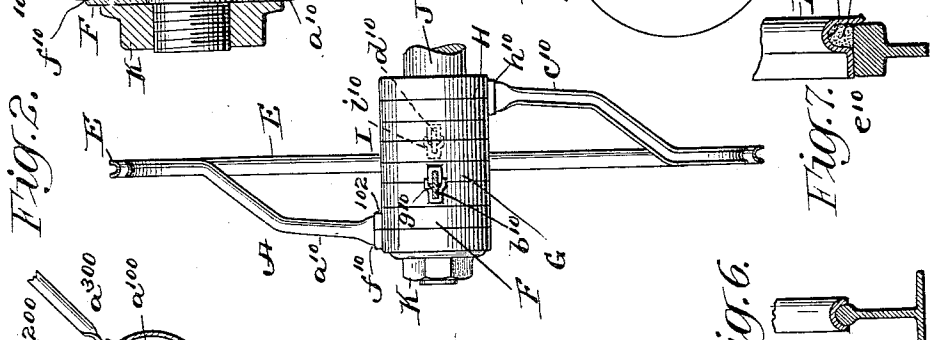

Fig. 2.

Fig. 7.

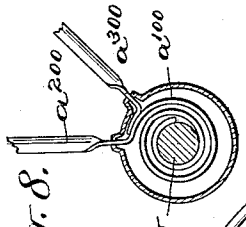

Fig. 8.

Fig. 6.

Fig. 1.

WITNESSES

J. M. Fowler Jr.

A. Stockman.

INVENTOR

Wm. F. Doll

BY

C. J. Stockman

ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM F. DOLL, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO LEE McCLUNG, OF WASHINGTON, DISTRICT OF COLUMBIA; ROBERT G. McCLUNG ADMINISTRATOR OF SAID LEE McCLUNG, DECEASED.

RESILIENT WHEEL.

1,136,869. Specification of Letters Patent. **Patented Apr. 20, 1915.**

Application filed June 24, 1914. Serial No. 847,036.

To all whom it may concern:

Be it known that I, WILLIAM F. DOLL, a citizen of the United States, residing in the borough of Manhattan, city of New York, county of New York, and State of New York, have invented new and useful Improvements in Resilient Wheels, of which the following is a specification.

This invention has reference to spring wheels, pulleys and the like, and its aims are to provide the same with certain new and useful features substantially as hereinafter described and particularly pointed out in the subjoined claims.

In the accompanying drawings I have illustrated what I at present regard to be the preferred embodiment of the invention, but it is to be understood that the invention may be otherwise embodied without departing from its spirit or the scope of the subjoined claims.

In said drawings, wherein like characters of reference denote similar parts in the several views: Figure 1 is a side elevation of a resilient wheel embodying the present improvements with a portion broken away, Fig. 2 is a section on the line 2—2 of Fig. 1. Fig. 3 is a vertical longitudinal section through the hub or axial portion of the wheel, drawn to a larger scale than the preceding figures. Fig. 4 is a detail view of one of the casings with a portion thereof broken away. Fig. 5 is a vertical section on the line 5—5 of Fig. 4. Figs. 6 and 7 are detail views exemplifying different forms of rims for use with different forms of rails when the invention is embodied in a car wheel; and Fig. 8 is a detail view exemplifying a form in which each coil at the axial part of the wheel carries a plurality of spokes.

The wheel herein illustrated to exemplify the present invention is formed of members A, B, C and D, having axially coiled parts *a*, *b*, *c* and *d* and spokes a^{10}, b^{10}, c^{10} and d^{10} extending outward from the axially coiled parts: a rim E to which the outer ends of the spokes are suitably connected: and incasing means for the axially coiled parts, comprising members F, G, H and I having chambers *f*, *g*, *h*, and *i* to receive said axially coiled parts and openings f^{10}, g^{10}, h^{10} and i^{10} to permit the spokes to extend therethrough. The parts are so correlated that in the completed wheel the axially coiled parts *a*–*d*, inclusive, will lie one beside another, with their axial openings alined to receive a shaft or axle J, or other device, and will be separated from each other by and inclosed in the members F—I, respectively, and the spokes will project radially from the said axially coiled parts and will extend through the openings f^{10}—i^{10} in the members F—I.

A suitable device extends through the alined openings of the springs *a*—*d* and also through alined openings of the members F—I, the springs encircling said device and being in turn encircled by the outer walls of said members, and the latter are suitably secured to said device against axial and longitudinal movement thereon. In this particular exemplification of the invention, the device referred to is the shaft or axle J, it being preferred to have the latter rotate with the wheel. If, however, it is desired, for example, to have the wheel rotate relatively to a stationary shaft, a device, such as a sleeve or cylinder to receive said shaft, may be utilized. For connecting the shaft or other device to the members F—I, the former is preferably formed with a suitable number of lugs 10 to engage appropriate recesses 11 in the members F—I. In practice it is preferred to provide four lugs for each member F—I, the latter having a corresponding number of recesses to receive said lugs, but said number may be varied, if desired. It is also preferred to form the part of the shaft or axle upon which the members F—I and coiled springs *a*—*d* are mounted of less diameter than the adjacent part of the shaft or axle, so as to form a shoulder *j* against which the line of members F—I may be tightly held by suitable means, such, for example, as a clamping nut K mounted on the threaded extremity of the shaft or axle.

It will be noted that among the other important purposes served by the members F—I they form means by which the power is transmitted between the spokes and the shaft or other device to which said members are secured, the spokes being fitted in the openings f^{10}—i^{10} in such manner that while the spokes may move longitudinally in said openings under the influence of the coiled springs, the latter do not form any part of the means through which rotative movement is communicated between the wheel and the

shaft or other device to which said members are secured—the springs being thereby relieved from the burden of taking any strains due to the transmission of rotary movement between the wheel and the axle or other device which is encircled by the springs. Moreover, it will be noted that the side walls of the members F—I are so correlated with the coils as to permit free expansion and contraction thereof, while separating them from each other and preventing lateral displacement and wabbling movement thereof, thereby materially contributing to their free resilient action. Again, the outer walls of the members F—I protect the springs against atmospheric influences and dust and dirt.

In practice, it is preferred to form each of the members F—I of two complementary sections each having a side wall 100 and a peripheral flange 101, the peripheral flanges extending toward each other and having their abutting edges preferably arranged so that one will overlap the other, the underlapping edge being preferably formed to provide a seat for the overlapping edge, as shown best in Fig. 3. The portions of the members which form the openings f^{10}—i^{10} are preferably formed to provide flanges 102 which surround said openings and bear against the sides of the spokes. The side walls 100 are formed with openings to receive the shaft J, or other device employed in lieu of such shaft, and the circumferential walls of said openings are formed to provide recesses 11 hereinbefore referred to.

The rim E may be of any suitable shape in cross section. In Fig. 6 I have shown a rim of concavo-convex form engaged with a convex rail. In Fig. 7 I have shown a rim marked E^{10} having a flat section e^{10} and a concave section e^{11}, the concave section being provided with a sound-deadening and wear-reducing substance e^{12}. This form is particularly advantageous for use with a T-rail. While I have illustrated, in Figs. 6 and 7, the rim as being mounted upon a rail it will of course be understood that the invention is not restricted to car wheels.

I have exemplified the invention in a wheel made up of four members, each having a spoke and a coiled spring, but it will be apparent that this particular number of spokes is not essential and that the invention may be embodied in a wheel having any suitable number of spokes. In many cases it is preferred to form the spokes and springs integral with each other. In some cases the spokes may be formed separately from the springs and secured to the ends of the latter in any appropriate way, as by means of welds or rivets. In other cases, each spring may be provided with a plurality of spokes, in which event it is preferred to form one spoke integral with the spring and to suitably secure an additional spoke, or additional spokes, to said spring. The last named form is exemplified in Fig. 8, wherein a^{100} designates a spring, a^{200} designates a spoke integral therewith and a^{300} designates a separate spoke which is suitably secured to the outer coil of the spring.

The members *a*—*d* hereinbefore described are each preferably formed from channel iron having one end thereof gradually flattened, the flattened part forming the coiled spring and the part which remains of channel formation forming the spoke. This provides rigid spokes terminating in integral springs a portion of which springs are of gradually widened formation, it being noted, by reference to Fig. 3, that the taper of the spring part preferably does not extend throughout the length of said spring part but terminates near the spoke and is principally in that part of the member which joins the spoke to the spring. By thus having a plurality of coils of substantially the same width, and by making this width substantially the same as the diameter of the member which is to incase the coils, the lateral displacement of the coils and the tendency of the coils to wabble is more effectively overcome.

It will be noted upon reference to Fig. 2 that the spokes are laterally offset in order that their outer ends may abut against the inner surface of the separately formed rim E. While in this particular exemplification I have shown the separately formed rim, and prefer the same, it should be understood that it will not be a departure from the spirit of the invention to form the rim integral with the spokes or to have a plurality of rims arranged side by side. Exemplifications of the latter arrangements are shown in my co-pending application filed January 24, 1914, Serial No. 814,164. Moreover, while I prefer to form the parts *a*—*d* from channel-iron, this is not altogether essential as they may be made from flat strips, as shown in my co-pending application No. 814,165, filed January 24, 1914.

The several wheels exemplified in the two applications hereinbefore noted, among others not necessary herein particularly to set forth, present embodiments with which features constituting the present invention may be usefully employed, and, therefore, I would have it understood that my present invention, considered in its broadest aspects, is not restricted to any of the particular embodiments herein illustrated, or referred to.

Having thus described the invention what I believe to be new and desire to secure by Letters Patent, is:—

1. A resilient wheel having a plurality of members each provided with a coiled spring

at its end and with a spoke extending outward from the coiled spring, said members being so arranged that the spokes will extend radially from the springs and the springs will lie beside each other with their axial openings alined, and means forming chambers which receive said springs and having openings through which the spokes extend.

2. A resilient wheel having a plurality of members each provided with a coiled spring at its end and with a spoke extending outward from the coiled spring, said members being so arranged that the spokes will extend radially from the springs and the springs will lie beside each other with their axial openings alined, a device extending through the alined openings of the springs, and means connected to said device and spokes and transmitting movement between the same, said means having chambers which receive the springs, respectively.

3. A resilient wheel having a plurality of members each provided with a coiled spring at its end and with a spoke extending outward from the coiled spring, said members being so arranged that the spokes will extend radially from the springs and the springs will lie beside each other with their axial openings alined, a shaft extending through the alined openings of the springs, and means connected to said shaft and spokes and transmitting movement between the same, said means having chambers which receive the springs, respectively.

4. A resilient wheel having a plurality of members each provided with a coiled spring at its end and with a spoke extending outward from the coiled spring, said members being so arranged that the spokes will extend radially from the springs and the springs will lie beside each other with their axial openings alined, a shaft which extends through the alined openings of the springs, members mounted on said shaft, the latter members being arranged to provide openings through which the spokes extend and chambers which respectively receive the springs.

5. A resilient wheel having a plurality of members each provided with a coiled spring at its end and with a spoke extending outward from the coiled spring, said members being so arranged that the spokes will extend radially from the springs and the springs will lie beside each other with their axial openings alined, a device extending through the alined openings of the springs, casings for said springs, said casings being mounted on the shaft and secured to the same and each comprising side walls and a circumferential wall, arranged to contain a spring, the circumferential walls of the casings having openings through which the spokes extend, the latter openings being fitted to the spokes, whereby rotary movement of said device and spokes will be transmitted through the casings.

6. A resilient wheel having a plurality of members each provided with a coiled spring at its end and with a spoke extending outward from the coiled spring, said members being so arranged that the spokes will extend radially from the springs and the springs will lie beside each other with their axial openings alined, a device extending through the alined openings of the springs, casings for said springs, said casings being mounted on the shaft and secured to the same and each comprising a separable pair of side members having circumferential flanges, the said side members and flanges being arranged to form a casing having side walls and a circumferential wall, each casing containing a spring, the circumferential walls of the casings having openings through which the spokes extend, the latter openings being fitted to the spokes, whereby rotary movement of said device and spokes will be transmitted through the casings.

7. A resilient wheel having a plurality of members each formed to provide a rigid spoke and a coiled spring arranged at the inner end of the spoke and integral therewith, said members being so arranged that the spokes will extend radially from the springs and the springs will lie beside each other with their axial openings alined, and means forming chambers which receive said springs and have openings through which the spokes extend.

8. A resilient wheel having a plurality of members each formed to provide a rigid spoke and a coiled spring arranged at the inner end of the spoke and integral therewith, said members being so arranged that the spokes will extend radially from the springs and the springs will lie beside each other with their axial openings alined, a device extending through the alined openings of the springs, and means mounted on said device and inclosing said springs, said means forming chambers for the springs, respectively, and being connected to said device and spokes for transmitting rotary movement between the same.

9. A resilient wheel having a plurality of members each formed to provide a rigid spoke and a coiled spring arranged at the inner end of the spoke and integral therewith, said members being so arranged that the spokes will extend radially from the springs and the springs will lie beside each other with their axial openings alined, a shaft extending through the alined openings of the springs, said shaft having a shoulder at one end, means arranged on said shaft and secured thereto, said means forming a plurality of separate chambers each of which

receives a spring and has an opening fitted around the spoke projecting from said spring, one end of said means engaging the shoulder at one end of the shaft and a clamping nut which is threaded on the other end of said shaft and engages the other end of said means.

10. A resilient wheel comprising a plurality of spring bars formed of channel iron, each of said bars having one of its ends flattened and spirally coiled to form a spring, a portion of said bar forming a rigid spoke, the said bars being so arranged that the parts thereof which have been flattened and coiled will lie side by side with their axial openings alined, means forming chambers which receive the flattened and coiled parts of the bars and are connected to the spoke portions of the bars, and a device which extends through the coiled parts of the bars and also extends through said means and is connected to the latter.

11. A resilient wheel comprising a plurality of spring bars formed of channel iron, each of said bars having one of its ends flattened and spirally coiled to form a spring, a portion of said bar forming a rigid spoke, the said bars being so arranged that the parts thereof which have been flattened and coiled will lie side by side with their axial openings alined, and a rim connected to the ends of said bars.

12. A resilient wheel having a member provided with a coiled spring at one end and a plurality of spokes projecting radially from said spring.

13. A resilient wheel having a member provided with a coiled spring at one end and a plurality of spokes projecting radially from said spring, one of said spokes being integral with the spring and the other formed separately from the spring and secured to the outer coil thereof.

14. A resilient wheel having a plurality of members each provided with a coiled spring at one end and with a spoke integral with said spring, the said members each also having an additional spoke connected to its spring, said members being so arranged that the springs will lie beside each other with their axial openings alined and the spokes will extend radially from the springs.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM F. DOLL.

Witnesses:
FREDERICK J. MCBRIDE,
THOS. G. BAILES.