W. F. DOLL.

RESILIENT WHEEL.

APPLICATION FILED JAN. 24, 1914.

1,136,867.

Patented Apr. 20, 1915.

2 SHEETS—SHEET 1.

Fig. 3.



Fig. 4.



Fig. 5.



Fig. 12.



Fig. 10.

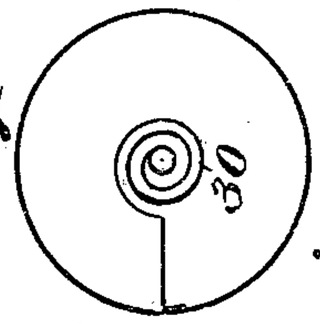


Fig. 11.



Fig. 6.

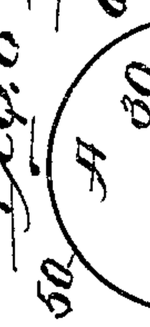


Fig. 7.



Fig. 8.

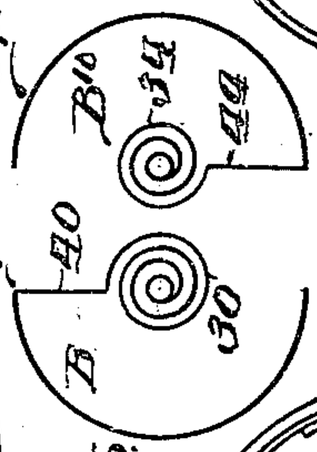


Fig. 9.

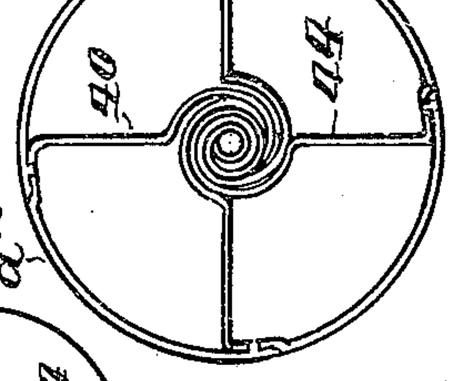


Fig. 2.

Fig. 26.

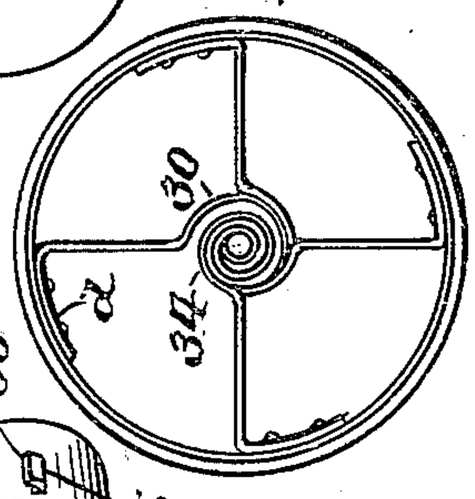


Fig. 13.

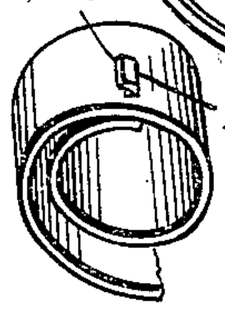


Fig. 1.

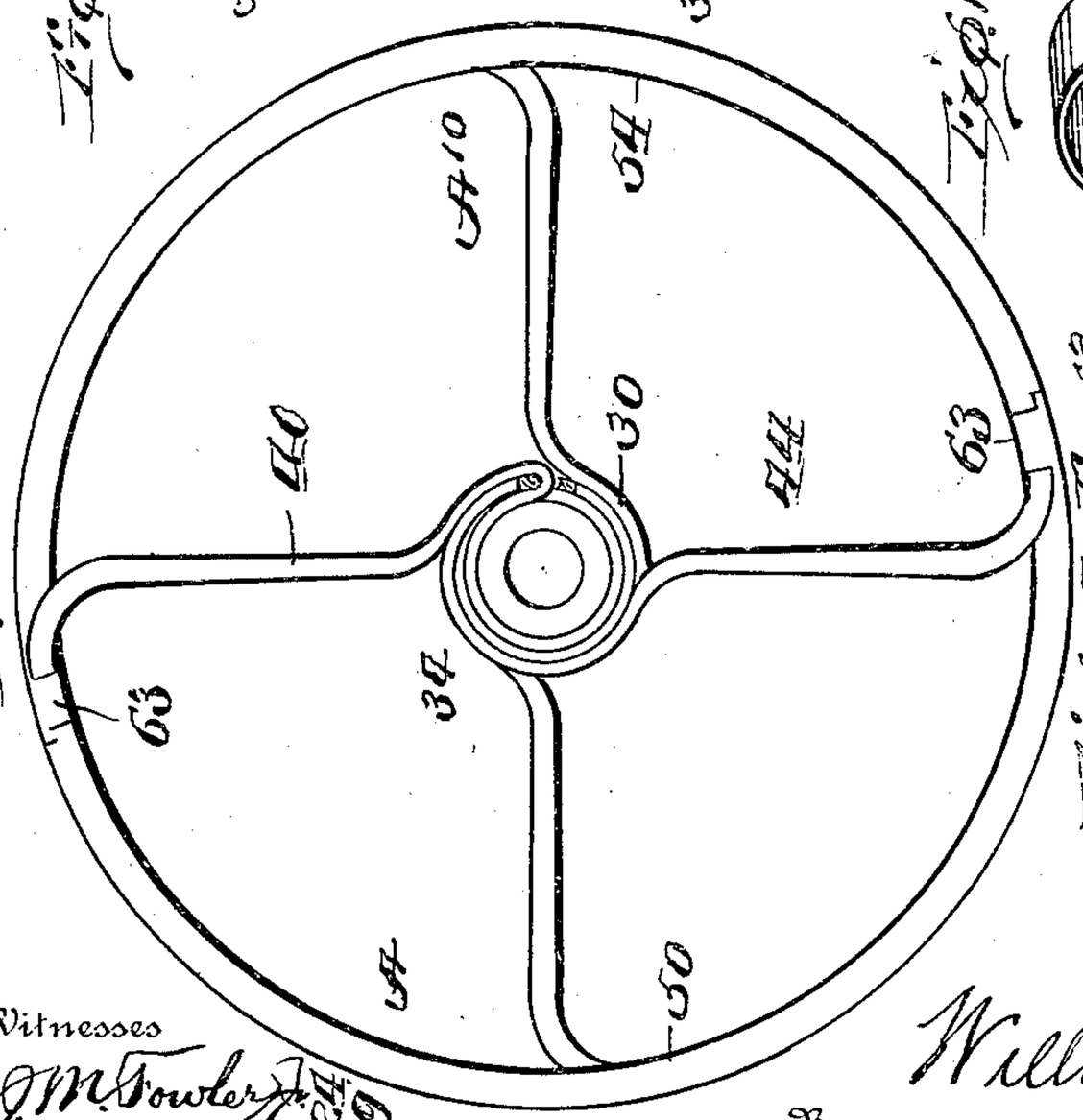


Fig. 14.



Fig. 27.

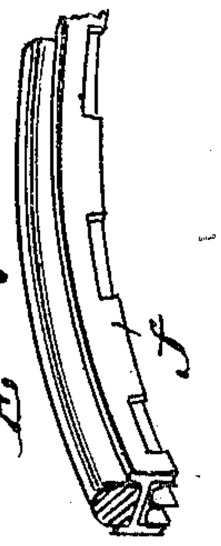


Fig. 24.



Witnesses

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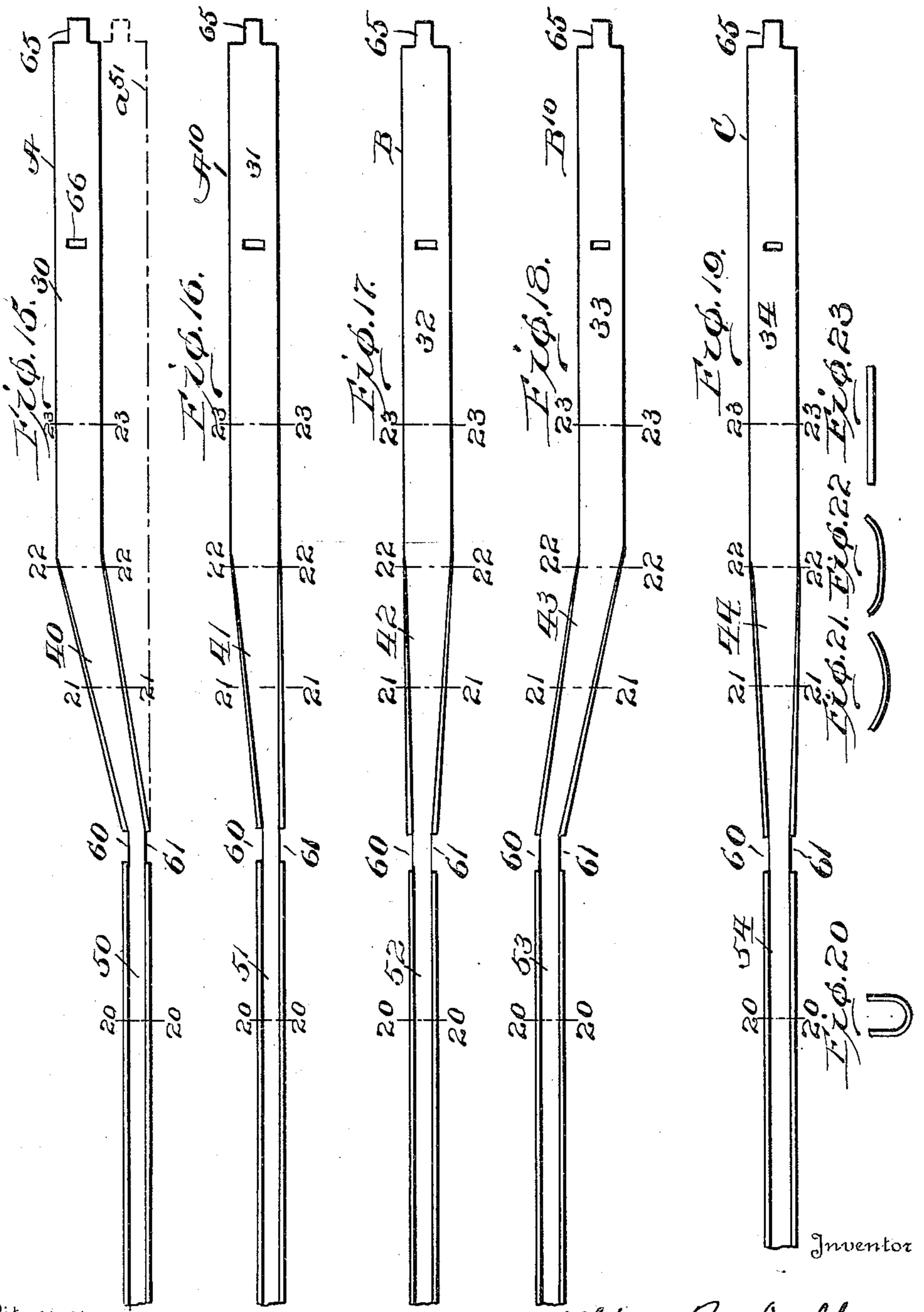
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2 SHEETS—SHEET 2.



Witnesses

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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.

1,136,867. Specification of Letters Patent. Patented Apr. 20, 1915.

Application filed January 24, 1914. Serial No. 814,164.

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, in the city, county, and State of New York, have invented new and useful Improvements in Resilient Wheels, of which the following is a specification.

The purpose of this invention is to provide a spring wheel which includes several new and useful features coöperating with each other to make the wheel most practicable.

In the accompanying drawings I have shown different forms of wheels embodying my novel features and have therein exemplified various correlations and combinations of parts which may be employed without departing from the spirit of the invention or the scope of the subjoined claims. It should be understood, however, that these are merely exemplary and that the invention may be otherwise and variously embodied within the scope of the protection afforded by the subjoined claims.

Referring to the drawings, wherein like characters of reference denote corresponding parts in the several views:—Figure 1 is a side elevation of one form of wheel embodying the present improvements, showing a part of the same broken away to disclose a means whereby one end of the coiled section at the axis of the wheel is secured. Fig. 2 is an edge view of the same; Figs. 3, 4 and 5 are detail views showing the means of securing the end of one member to the adjacent member at the rim; Fig. 3 being a detail perspective view showing the extremity of one member formed with a fastening element, Fig. 4 being a detail view of the part of the rim-section of the next member which is formed to be engaged by said fastening element, and Fig. 5 being a view showing the rim-sections connected to each other; Fig. 6 is a diagrammatic representation of one of the members forming part of the wheel; Fig. 7 is a like view showing the member which is complementary to that illustrated in Fig. 6; Figs. 8 and 9 are like views of two other members which are complementary to each other and which are associated with the two members shown in Figs. 6 and 7 in the production of the wheel particularly illustrated in Figs. 1 and 2; Fig. 10 is a diagrammatic representation of a wheel formed from a single member; Fig. 11 is an edge view of the same; Fig. 12 is an edge view of a wheel formed of two members like those illustrated in Figs. 10 and 11; Fig. 13 is a detail perspective view showing the inner coiled extremity of any one of the foregoing members illustrating a desirable way for fastening said extremity; Fig. 14 is a detail perspective view of a portion of an auxiliary rim which may be used around any of the wheels herein referred to; Figs. 15, 16, 17, and 18 are views illustrating the members from which the wheel shown in Figs. 1 and 2 is produced, said members being shown in flat form,—that is, before they have been coiled, and each broken off at the rim end; Fig. 19 is a similar view illustrating the member forming the wheel shown in Fig. 10; Figs. 20, 21, 22 and 23 are cross sections taken on the lines 20—20, 21—21, 22—22, and 23—23, respectively on any one of Figs. 15—19, inclusive; Fig. 24 is an auxiliary detail view showing a rim which may desirably be employed when the wheel is intended to be used as a car wheel; Fig. 25 is a side elevation illustrating a form of wheel wherein the rim is made up of four rim sections locked to each other; Fig. 26 is a side elevation of a modified form, wherein the rim is separate from rim sections, which are integral with the spokes and hub. Fig. 27 is a detail representation showing a part of an auxiliary rim which may be employed when it is desired both to hold the rim units against lateral displacement and to retain a rubber tire.

Each of the wheels herein exemplified is made up of one or more members A, A^{10}, B, B^{10} and C formed of spring metal. These members comprise hub or axial portions 30—34, spoke-portions 40—44 and rim portions 50—54. The hub or axial portions 30—34 are each coiled to form one or more spiral convolutions which give the necessary resilience to the wheel; and the rim-portions 50—54 extend in a curved line from the

outer end of the spoke-portions 40—44 respectively and are of lengths suitable for the purpose which they are intended to serve, the rim-portion in certain exemplifications of the invention forming a complete circle, in other exemplifications of the invention forming sections adapted when united to like sections to form a complete circle and in still another exemplification of the invention forming a flange to which a separate rim may be secured. The hub or axial portions 30—34 are wider than the rim-portions 50—54 and the spoke portions 40—44 are tapered outward from the hub or axial portions to the rim-portions.

When a wheel for very light use is intended it may be made of a single member, as indicated in Figs. 10 and 11, for example. This member is preferably the one shown in Fig. 19 and marked C. It will be noted that in this form the rim-part 54 is in line with the axial part 34, both edges of the spoke-part 44 being equally beveled between the part 34 and the part 54, and the part 54 is bent to form a complete circle, forming a rim narrower than the axial part and disposed over the center of the same, (see Figs. 10 and 11), this arrangement of rim with respect to the axial part being highly desirable. Such a wheel will have only one spoke and in most cases it is desirable to have two or more spokes. Therefore, I prefer constructions wherein the axially coiled part and a narrower rim are retained and yet the two parts referred to are connected with each other by spokes which are integral therewith. For a simple two-spoke wheel of the last named kind, the two members A and A^{10} or the two members B and B^{10} may be employed. It will be noted that the member A has its rim part 50 out of line with its part 30, a distance corresponding to the width of the part 31 of the complementary member A^{10}, as shown by the broken line a^{31}, while said member A^{10} has its rim-part 51 only slightly offset from its part 31, the position of the part 51 being such that a line drawn from one of its longitudinal edges will pass longitudinally through the part 31 at approximately the transverse center of the latter, as shown by the broken line a^{51}. This is true also of the two complementary members B and B^{10}, the member B being a duplicate of the member A^{10} and the member B^{10} being a duplicate of the member A. Each rim part 50—53 in the form of the invention exemplified in Figs. 1, 2, 6, 7, 8 and 9 is bent from the spoke-part of its member to form one-half of the rim. The result is that when the two parts 30 and 31 of the members A and A^{10} (or the corresponding parts 32 and 33 of the members B and B^{10}) are coiled and disposed beside and in contact with each other and are so arranged that the spokes will be approximately at an angle of 180 degrees to each other, the rim-parts 50 and 51 (or 52 and 53) will meet and form a complete rim which has a width of one-fourth the length of the hub, but will not be disposed over the center of the latter. The range of utility of such a wheel, however, will probably be slight as compared with that of a wheel having a greater number of spokes, and accordingly I prefer the latter. In such case it is preferred to employ a wheel formed of the members A and A^{10} and a wheel formed of the members B and B^{10} as separate units of a complete wheel, arranged side by side and so correlated that the spokes of one will alternate in position with the spokes of the other. The particular members exemplified in Figs. 15—18 inclusive are especially adapted for conjoint use in the formation of a four-spoke wheel of well balanced construction, it being noted that when they are arranged with the member A^{10} next to the member A, the member B next to the member A^{10} and the member B^{10} next to the member B, the rim will be made of four sections two of which sections, to wit, 50 and 51, form one complete circle and the remaining two sections form another complete circle arranged beside the first, and the parts will be so correlated as to have the additional important advantage of being provided with a rim which lies over the center of the hub formed by the parts 30—33, inclusive, the spokes of the outermost members A and B^{10} being inclined to the right and left respectively from the outer ends of the hub to a plane which intersects the hub at the longitudinal center of the latter.

Each of the referred to members is further formed with means whereby each rim section is locked to its mate. A desirable means for this purpose is shown in the drawings and comprises lateral recesses 60 and 61 formed in each rim section near the spoke and a hook having sides 62 and 63 formed in the extremity of each rim-section, the hook 62—63 of one rim section engaging the recesses 60 and 61 in the next rim-section, as shown. It will be noted that the part of each rim-section adjacent to the recesses 60 and 61 is depressed as shown at 64 forming a seat which receives the extremity of the mating rim-section to provide a smooth surface where the parts are united to each other.

The inner extremity of each member A, A^{10}, B, B^{10} and C is preferably suitably secured to an adjacent convolution of its member and for this purpose I prefer to form each of said members with a tongue, as 65, to engage an aperture 66.

While I have herein exemplified constructions of wheels having one spoke, two spokes and four spokes, it will be understood that

the invention may be embodied in wheels having other numbers of spokes without departing from its spirit, and it will also be understood that in such case the rim-sections instead of forming either a whole circle or a half circle will be of a length according to the number of spokes which are to be employed and according to whether the wheel is made up of one unit or of more than one unit. Thus, for example, a four-spoke wheel, within the spirit of the present invention may be produced by using four members each having a rim-section so arranged in the completed wheel as conjointly to form a complete circle, that is, each forming one-fourth of the circle, as exemplified in Fig. 25.

While I would have it understood that I greatly prefer a construction of wheel which embodies a plurality of units each having a rim formed in sections locked to each other, and which rim-sections are formed integral with the spokes and a resilient hub made of one or more convolutions: yet I would have it understood that in its broadest aspects the invention may be embodied in a construction wherein a separate rim is used and is suitably secured, as by means of rivets, to the rim sections, the latter in such case merely serving as means whereby the rim is connected to the portions forming the spokes of the wheel. Such an arrangement is exemplified in Fig. 26, wherein the rim is marked D and the rim-sections are marked *d*.

It is preferred to form each member A, A^{10}, B, B^{10} and C of U or other suitable channel shape in cross section with the portion thereof which is to form a spoke rolled out so as to be gradually widened and flattened toward the part which is to be coiled, the latter part being flat in cross section and of uniform width and thickness and approximately twice as wide as the channeled part which forms a section of the rim, as shown in the drawings. The members may be thus made in a practicable and economical way and will present maximum strength and durability. It will be noted that the spokes in this construction of wheel are substantially rigid and that they radiate from the hub, instead of being resilient and curved.

It will be understood of course that the rim in practice may be encircled by an auxiliary rim or a tire of suitable kind. It is particularly preferred when the wheel has two or more units arranged side by side to provide a means which will hold the rims of the units against lateral displacement from each other and this means may be arranged to also form a separate rim for the wheel. I have herein exemplified two forms of such auxiliary rims. In one of the forms (see Fig. 27) the auxiliary rim, marked E, is specially adapted not only to retain the rim-units against lateral displacement but also to retain a cushion or other suitable tire. In the other form (see Fig. 14) the auxiliary rim is intended for use in cases wherein the need of a wheel which will grip the roadway is indicated. This auxiliary rim is marked F and it will be noted that it has depending spaced flanges or fingers *f* which preferably should have sufficient elasticity to tightly grip the sides of the rim-units. The outer surface of this rim has transverse depressions or recesses *f'* which are separated from each other by the solid portions f^2, the latter forming spaced gripping and anti-slipping projections. In practice each of these auxiliary rims will preferably be made in sections arranged end to end.

In Fig. 24, I have exemplified a third form of auxiliary rim, marked G. This exemplification has the outer flange, *g*, for use when the wheel is to be used as a car wheel, but this is not essential as it may be a flat rim if preferred. Its depending flanges for preventing lateral displacement of the rim-units are marked *g'*. In this particular exemplification, I have shown the auxiliary rim provided interiorly with a material marked g^2 of any suitable kind to deaden the vibrations set up in the tire when in use, thereby serving as a sound-deadening rim.

While I have described the invention as being particularly for use as a vehicle wheel, it will be apparent that it may be embodied as a gear wheel, a pulley or the like and hence I do not wish to be understood as being restricted to the embodiment of the invention in a vehicle wheel.

Having now described my invention and exemplified various specifically different embodiments thereof, what I believe to be new and desire to secure by Letters Patent, is:—

1. A resilient wheel, having an element made of spring metal one of whose ends is coiled, the said element having integral with its coiled portion a rigid substantially straight spoke which extends outward from its coiled portion and is arranged at an angle to the same.

2. A resilient wheel having an element made of spring metal one of whose ends is coiled, the said element having integral with its coiled portion a rigid, straight spoke which extends outward from its coiled portion and is provided with a rim section projecting from its outer end.

3. A resilient wheel having an element made of spring metal one of whose ends is coiled, the said element having integral with its coiled portion a rigid, straight spoke which is tapered outward from the coiled portion and is provided with a rim section projecting from its outer end.

4. A resilient wheel comprising a spring bar one of whose ends is flattened, the other of whose ends is of channel formation and the intermediate part of which is flattened

and widened from the flattened end of the bar to the channeled part thereof, the said flattened end of the bar being coiled and disposed around the hub and the said intermediate part forming a spoke.

5. A resilient wheel comprising a spring bar one of whose ends is flattened, the other of whose ends is of channel formation and the intermediate part of which is flattened and widened from the flattened end of the bar to the channeled part thereof, the said flattened end of the bar being coiled, the said intermediate part forming a spoke and extending outward from the coiled part at an angle thereto and the channel end of the bar forming a rim section and extending from the outer end of the spoke portion in a forwardly curved direction.

6. A resilient wheel comprising a plurality of units arranged side by side, each of said units comprising a bar of spring metal formed to provide a longitudinally curved rim-portion, a spoke-portion and a coiled hub-portion integral with each other, the hub portions being arranged in an endwise relation to each other and the rim-portions similarly arranged one beside the other and being rigid and of substantially channel shape.

7. A resilient wheel comprising a plurality of units arranged side by side, each of said units comprising a bar of spring metal formed to provide a longitudinally curved rim-portion, a spoke-portion and a coiled hub-portion integral with each other, the hub portions being arranged in an endwise relation to each other and the rim-portions similarly arranged one beside the other, and means extending over the outer surfaces of the rim-portions for holding the same against lateral displacement, the spoke portions of said units extending radially from the axial portions thereof and being tapered outward from the latter to the rim portion.

8. A resilient wheel comprising a plurality of units arranged side by side, each unit including a bar of spring metal having a coiled section at one end, a curved section at the other end and an intermediate tapered part, the coiled section being wider than the curved section, the coiled sections of the units being arranged in an endwise relation to each other and the curved sections being disposed over the center of the coiled sections, the intermediate parts being laterally inclined and extending approximately radially from the coiled sections.

9. A resilient wheel comprising a plurality of units arranged side by side, each unit including a bar of spring metal one of whose ends is of channel formation and is curved longitudinally, the other of whose ends is flattened transversely and coiled longitudinally and the intermediate portion of which bar is gradually widened and flattened from the channeled end to the coiled end of the bar, the coiled parts of each bar being wider than the channeled parts thereof, the coiled parts of the units being arranged in an endwise relation to each other and the channeled parts being disposed over the center of the coiled parts, the intermediate portions being radially arranged and inclined laterally.

10. A resilient wheel comprising a plurality of units arranged side by side, each unit including a bar of spring metal one of whose ends is of channel formation and is curved longitudinally, the other of whose ends is flattened transversely and coiled longitudinally and the intermediate portion of which bar is gradually widened and flattened from the channeled end to the coiled end of the bar, the coiled parts of each bar being wider than the channeled parts thereof, the coiled parts of the units being arranged in an endwise relation to each other and the channeled parts being disposed over the center of the coiled parts, the intermediate portions being radially arranged and inclined laterally, and a separate rim extending over the curved parts and holding the same against lateral displacement from each other.

11. A resilient wheel comprising a metallic resilient member having a coil at one end and provided at the inner extremity of said coil with a tongue, the member also having an aperture which receives said tongue.

12. A resilient wheel comprising a plurality of metallic members having a spoke, a longitudinally curved section integral with the spoke and a coiled part forming a portion of the hub, said longitudinally-curved parts being arranged to form a rim and having means for locking them to each other.

13. A resilient wheel comprising a plurality of metallic members each having a spoke and a longitudinally curved part integral with the spoke, the said members being so arranged that the longitudinally curved parts will form a rim and each of said longitudinally-curved parts having a hook at one extremity and a recess adjacent to its spoke, the parts being so arranged that the hook end of one rim section will lie upon the next section and its hook will engage the recess in the latter.

14. A resilient wheel comprising a plurality of metallic members each of which has one end of channel formation and curved longitudinally, its other end flat and its intermediate part of gradually widening and flattening formation from its longitudinally curved channeled end to the flattened end, the said flattened end being coiled, the said intermediate part forming a spoke and the channeled longitudinally-curved part

forming a section of the rim and having recesses formed adjacent to the spoke and its extremity cut away at the sides to form hooks, the said members being so arranged that the sections of the rim will be locked to each other when the hooks of one are in the recesses of the next.

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

WILLIAM F. DOLL.

Witnesses:

JAMES L. CRAWFORD,

C. J. STOCKMAN.

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