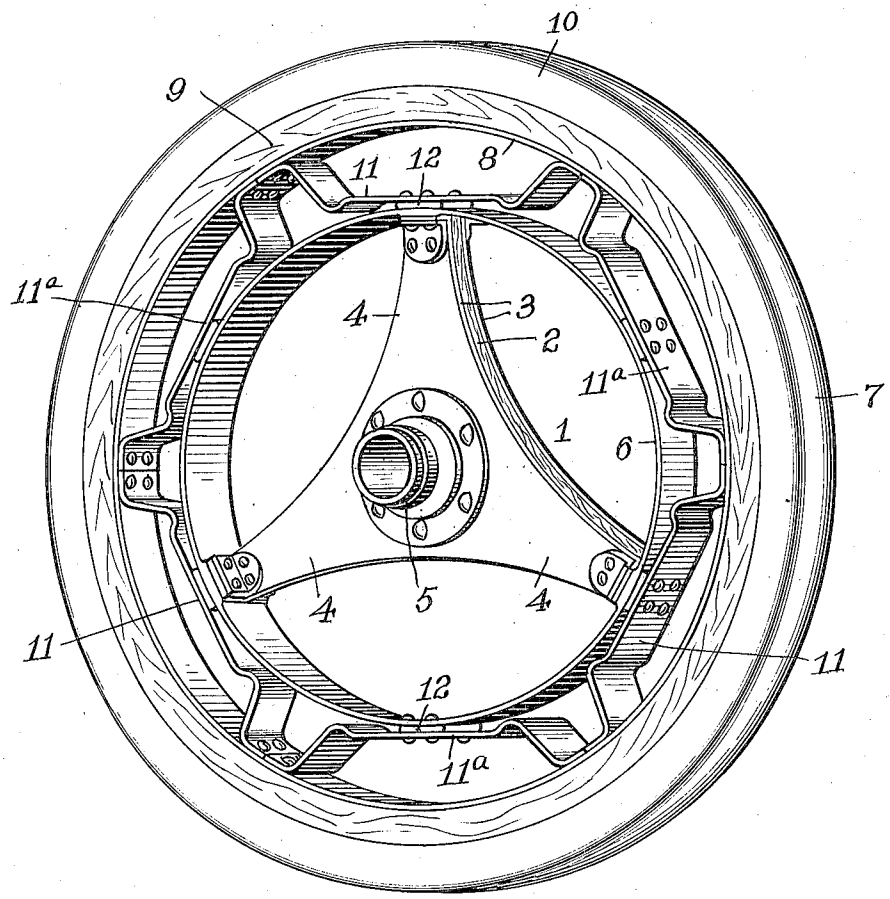
B. P. COOPER.

WHEEL.

APPLICATION FILED NOV. 5, 1910. RENEWED FEB. 3, 1913.

1,103,399. Patented July 14, 1914.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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WHEEL.

1,103,399. Specification of Letters Patent. Patented July 14, 1914.

Application filed November 5, 1910, Serial No. 590,866. Renewed February 3, 1913. Serial No. 746,034.

To all whom it may concern:

Be it known that I, BENSON P. COOPER, residing at Ithaca, in the county of Tompkins and State of New York, a citizen of the United States, have invented or discovered certain new and useful Improvements in Wheels, of which improvements the following is a specification.

This invention relates to spring wheels for vehicles, of the type in which a spring ring is employed between the hub and the felly, as for example the wheel described in my copending application Ser. No. 590,865 and the chief object of the invention is to provide an improved wheel of this type, in which greater resiliency and easier riding qualities may be obtained with increased strength and durability.

To this and other ends the invention consists in the novel features of construction and combination of elements hereinafter described and more particularly set forth in the appended claims.

The preferred embodiment of the invention is illustrated in the accompanying drawing, in which the wheel is shown in perspective.

The hub member, designated generally by 1, is preferably composed of an intermediate block or plate of wood 2, bolted between two steel plates 3, with a number of spaced radial extensions or arms 4, making the whole a rigid element without joints at the center as in the case of an ordinary hub and spokes. By preference the hub-member is of the general triangular form shown with the sides curved slightly inward. In general the form of the hub-member effectually braces it, as it were, against stresses, applied in directions parallel with and at right angles to the axis of the wheel as will be readily understood. At the center of the hub-member is a bearing 5 for the axle.

Concentric with the hub-member and firmly secured to the ends of the extensions or arms 4, is a spring ring or band 6, which may be continuous. Outside of and concentric with the spring ring but spaced therefrom is a rigid felly 7, preferably composed of an inner steel rim or band 8, an outer felly of wood 9, and a tire 10 suitably mounted on the latter. The tire 10 may be formed of any suitable material preferably one that will afford a cushioning action and increase the tractive effect. The rigid felly and the spring band are connected together by steel blade springs 11, 11^a, tangential to the spring band, and in number equal to twice the number of extensions or arms 4 on the hub-member. Half of these tangential springs are connected firmly at their middle points to the hub-member extensions or arms, and the other half are connected at their middle points to the spring ring at the middle points between the hub-member extensions or arms. The ends of the springs are secured firmly to the outer felly of the wheel, and the lengths of the springs are such as to form in effect a polygonal spring ring the sides of which are secured tangentially to the circular spring ring or band and the angles to the rigid felly. Preferably these tangential springs have their ends bent into more or less resemblance to an S-shape, and I also prefer to provide small metal plates 12 between the springs 11, 11^a, and the spring ring or band 6, the ends of the plates having rounded edges, as shown, to avoid sharp bends in the spring elements at these points. The widths of the felly the tangential springs, the spring rim, and the hub-member are such as to afford adequate resistance to lateral stresses, for example such as are exerted on the wheel when the vehicle is turning a corner.

When the wheel is in use, for instance as a driving wheel of an automobile, the driving force or torque is exerted by the hub-member extensions or arms on the tangential springs in the form of a pull longitudinally of the latter. As the springs 11 are secured to the ends of the arms 4 the initial pull will be transmitted by them to the felly. If the resistance presented by the felly is sufficient these springs will lengthen thereby permitting a portion of the stress to be exerted on the band and be by it transmitted through the springs 11^a to the felly.

In the construction shown and claimed in the application referred to all of the driving strain or stress is transmitted from the hub-member through the resilient band to the felly, so that the band is always under tension when subjected to the shock incident to the wheel striking a stone or other obstruction, and the full resilience of the band is not available to lessen the jar or shock. It is characteristic of the construction described

herein that the resilient band is placed in turning the wheel, under such comparatively slight tension that practically all of its resilience is available to lessen the shock or jar due to the wheel striking an obstruction. And further the springs 11 and 11ª will also act to reinforce the shock absorbing action of the resilient band. This is especially true in regard to the springs 11ª. In transmitting the driving power of the felly, the tendency is to straighten the curves at one end of the tangential springs and bend the springs more sharply at the other end; that is, the springs not only yield radially of the wheel but also tangentially; but the curves mentioned are long and hence the springs are well able to take the strain without breaking.

The construction herein specifically shown and described is the one I prefer, the same having demonstrated by actual use that it possesses the strength and resiliency demanded for a successful wheel of this type, but it is to be understood that the invention is capable of other embodiments without departure from its proper spirit and scope.

I claim herein as my invention:

1. A vehicle wheel having in combination a hub-member having radial arms or extensions, a resilient band secured to said arms, a rigid felly, tangentially arranged springs for transmitting power from the hub-member to the felly and springs interposed between the felly and band for transmitting stresses from the felly to the band.

2. A resilient wheel for vehicles, comprising, in combination, a hub-member having a plurality of spaced extensions or arms and formed between such extensions to withstand torsional stress, a resilient band secured to said extensions, an outer rigid felly concentric with the band and spaced therefrom, and a series of springs between the band and felly, tangentially to the former, said springs being secured by their middle points alternately to the hub-member extensions or arms and to the band between such extensions and having their ends secured to the rigid felly.

3. A resilient wheel for vehicles comprising, in combination, a hub-member having a plurality of spaced radial arms, a resilient band secured to said arms, an outer rigid felly concentric with said band and spaced therefrom, and a series of springs constructed to yield radially and circumferentially interposed between the band and the felly and arranged tangentially to the former.

4. A resilient wheel for vehicles, comprising in combination, a rigid hub-member having a plurality of spaced radial arms, a resilient band mounted on the radial arms, a rigid felly concentric with the band and spaced therefrom, a plurality of springs arranged tangentially to the band and connected at their middle points to the respective arms of the hub-member and at their ends to the rigid felly and a plurality of similar springs connected at their ends to the said felly and at their middle points to the band between the arms of the hub-member.

5. A resilient wheel for vehicles, comprising in combination, a rigid hub-member having a plurality of spaced radial arms, a resilient band mounted on the arms, a rigid felly concentric with the band and spaced therefrom, yielding devices connecting the felly to the band at points midway between the hub-member arms, and yielding devices for transmitting forces from the hub-member arms to the rigid felly arranged tangentially of the former.

6. In a resilient wheel for vehicles, in combination, an inner element comprising a rigid hub-member having a plurality of spaced radial arms, and a resilient band mounted on the arms, an outer element comprising a rigid felly concentric with the band and spaced therefrom, and a plurality of springs connected to the outer element and tangentially to the band and capable of yielding tangentially as well as radially of the said band.

7. A resilient wheel for vehicles, comprising, in combination, a hub-element having a plurality of spaced radial arms, a resilient band mounted on said arms, a rigid felly concentric with the band and spaced therefrom, a series of tangential springs connected at their ends to the felly and at their middle points to the hub-member arms and the band, and buffer plates having rounded edges interposed between said middle points of the springs and the elements to which such points are connected.

In testimony whereof, I have hereunto set my hand.

BENSON P. COOPER.

Witnesses:
BERT T. BAKER,
HERMAN J. FRANTZ.