P. M. KLING.

SPRING WHEEL.

APPLICATION FILED OCT. 20, 1909.

1,077,410. Patented Nov. 4, 1913.

Fig. 1.

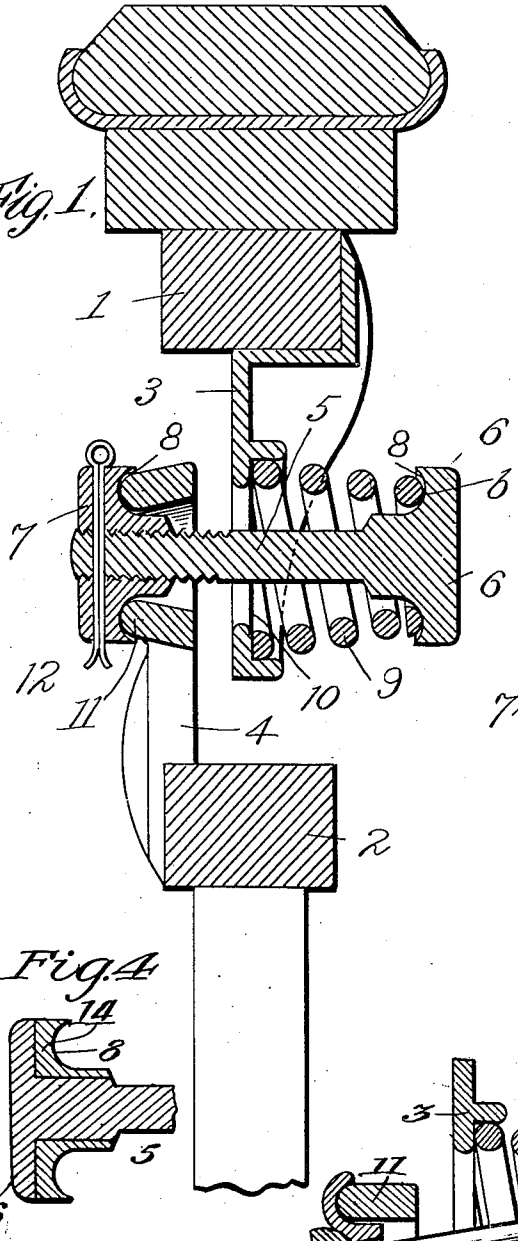


Fig. 2.

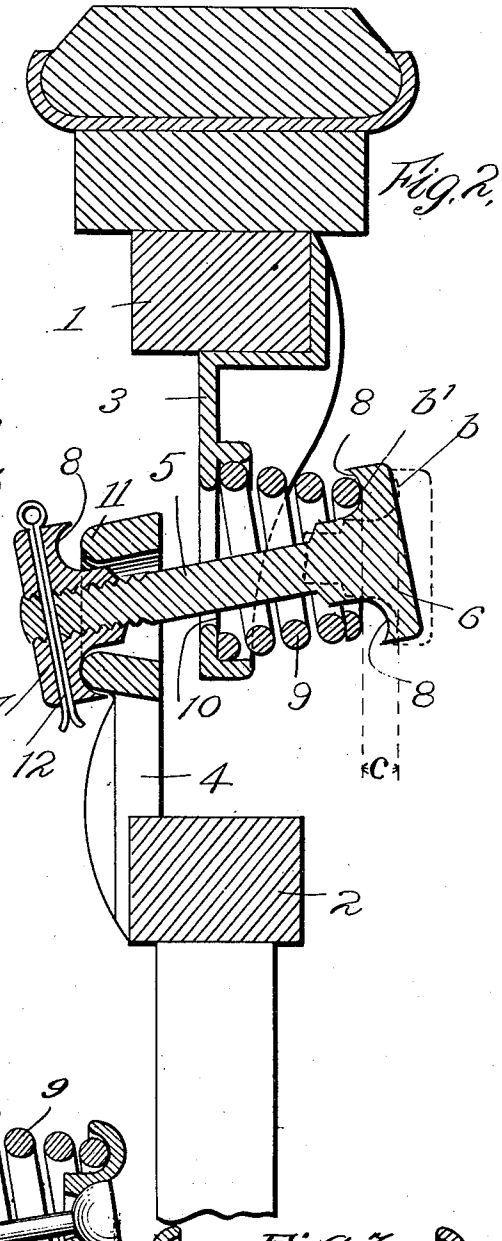


Fig. 4

Fig. 5.

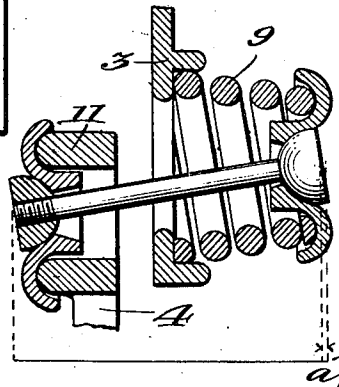
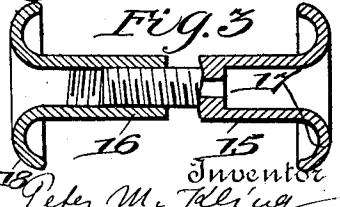


Fig. 3



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SPRING-WHEEL.

1,077,410. Specification of Letters Patent. Patented Nov. 4, 1913.

Application filed October 20, 1909. Serial No. 523,645.

To all whom it may concern:

Be it known that I, PETER M. KLING, a citizen of the United States, and a resident of Elizabeth, Union county, State of New Jersey, have invented certain new and useful Improvements in Spring-Wheels, of which the following is a full and clear specification.

My invention relates in general to so-called spring wheels in which between the portion of the wheel connected to the axle and the rim of the wheel, yielding members are interposed which are meant to form an equivalent for so-called pneumatic tires used at the present time on power driven vehicles.

My invention relates in particular to the type of such wheels illustrated in the United States Patents Nos. 954,522 and 954,523, both granted to me on April 12, 1910, the structure shown in my present invention forming an improvement in the detail arrangement of the yielding members interposed between the inner and outer rims of the wheels shown in these applications. I have therefore illustrated in the accompanying drawings only such portions of the wheel which are directly connected with my improvements, the general arrangement of these improved portions being clearly illustrated in the two patents above mentioned.

In the accompanying drawings Figure 1 is a vertical transverse section of a portion of the outer rim and the inner rim and of the bolt spring connecting these members. Fig. 2 illustrates a similar section showing the inner and outer rim displaced as it will occur when the wheel is in operation. Fig. 3 shows a modification of the bolt connecting the inner and outer member illustrated in Figs. 1 and 2. Fig. 4 is a detail illustration of a modification of the bolt head shown in Figs. 1 and 2, and Fig. 5 is an illustration of the connecting bolt as illustrated in my aforesaid Patent No. 934,522 in order to show the difference between the action of the bolt in said patent and the improved bolt forming the subject matter of the present application.

As will be seen from Figs. 1 and 2, 1 represents the outer rim of the wheel and 2 the inner rim, each provided with brackets disposed on alternately opposite sides of the rims as shown in detail in my aforesaid Patent No. 954,523. In this particular instance, I have illustrated the two coöperating brackets 3 and 4 of outer rim 1, and inner rim 2, respectively. Bracket 3 is provided with a dished spring seat 10 for seating the conical spiral spring 9 and bracket 4 is provided with a suitably shaped eye 11 with a tapered bore to form an abutment for screw head 7 of transverse bolt 5, the other fixed head 6 of which engages with its suitably shaped portion 8 the outer coil of spring 9. It may be also stated particularly with reference to the bracket structure shown in my aforesaid Patent No. 954,523, that the inner and outer rims, owing to the arrangement of their coöperating brackets have relative motion to each other only in the plane of their peripheries so that in the structure illustrated in the present invention the two brackets 3 and 4, illustrated in Figs. 1 and 2, have only vertical movement toward and from each other but they remain transversely at equal distances from each other. If now the wheel comes into action and for instance brackets 3 and 4 move away from each other, as shown in Fig. 2, bolt 5, which under the normal load is adjusted and disposed so that it will assume a horizontal position transversely to the brackets as shown in Fig. 1, will be deflected and assume the position shown in Fig. 2. This also occurs in all the modifications shown in my two aforesaid patents. However, from the illustration shown in Fig. 5, it will be noted that the bolt illustrated therein, like the bolt of similar form illustrated in my Patent No. 954,522, has rounded heads which have the effect of a ball joint, that is to say, when the bolt 5 is deflected as shown in dotted lines in Fig. 5, either of its heads will still rest with a full circular bearing surface against the abutment. The principal idea of my invention being that the spring interposed between the bolt head and the bracket either on one side of the bolt or on both, is compressed when the two brackets are displaced and the cause of this compression being the tilting or deflecting of the bolt, it will be seen that in the structure illustrated in the present Fig. 5 the amount of compression of the spring will only equal the difference between the actual length of the bolt and the length of its geometrical projection when in deflected position for instance, equal to distance *a* in Fig. 5.

It will be noted that it would be necessary to tilt or deflect the bolt at a considerable angle in order to obtain an appreciable amount of spring compression. This diffi-

culty of course could be overcome in case bolts of the form illustrated in Fig. 5 are used, by making the springs sufficiently strong so that the small compression distance *a* would be sufficient to furnish enough resiliency. However, the disadvantage of employing a short compression and off-setting this by a stronger spring are well known in the art. It is well known that the resiliency of such springs is very unsatisfactory. For this reason, I prefer the form of bolt head illustrated in Figs. 1 to 4, inclusive, in my present application.

From the illustration in Figs. 1 and 2 and the following description of the action of such bolts it will be noted that less strong springs can be employed and that, owing to the increased deflection of the springs produced thereby, greater resiliency is obtained. When the bolt is in its normal position, bolt head 6 is in contact with the whole periphery of the last coil in which it forms the abutment, and screw head 7 is also in contact with the whole periphery of its seat 11. Bolt head 6 is also illustrated in its normal position in dotted lines in Fig. 2. If now the inner and outer rims are displaced when the wheel is in action, as illustrated in Fig. 2, it will be noted that the two bolt heads 6 and 7 will now abut against their seats only at one point because the brackets 3 and 4 in this particular instance move only vertically and the coil diameter of spring 9 is small enough so that substantially the whole spring will be compressed by the one sided abutment of head 6 against the spring. Owing to this tilting action the point *b* at which, in the normal position, the spring will abut against head 6 will move into the position indicated at *b'* which is equal to the distance *c* between the two dotted lines indicated in Fig. 2. The bolt illustrated in Fig. 2 and that illustrated in Fig. 5 being drawn in the same scale, it will be seen that distance *c* which the spring is compressed, is considerably greater than the distance *a* in case of the form of bolt shown in Fig. 5. Therefore by employing heads of suitable diameter for the bolts, any suitable amount of compression can be obtained to obtain the proper resiliency for the wheels of a vehicle of a given weight.

The tension of the spring of course can be also adjusted by tightening or loosening screw head 7 which then of course must be always secured from turning by a cotter pin or other suitable means known in the art.

When the wheel is in motion the bolts have a rolling motion on their abutting surfaces so that there is only rolling friction between the two abutting surfaces and very little wear on the bolts. However, in order to provide for wear, I may provide on either bolt head, a removable bushing 14, Fig. 4, instead of shaping the heads directly to properly fit their abutments. This bushing may be replaced when worn out so that it is not necessary to throw the whole bolt away.

In order to save weight, I may also shape the bolt which connects the two brackets of pressed metal as is frequently used at present in the art. Such bolt is illustrated in Fig. 3. This bolt consists of portion 15 with the head 17 and portion 16 with the head 18, portion 15 being screwed into the hollow shank of portion 16.

What I claim is:—

1. A spring wheel comprising outer and inner members moving relatively to each other under the load which the wheel sustains when in use and resilient means yieldingly resisting said relative movement, comprising resiliently sustained bolts connecting the relatively moving parts; said bolts having rigidly related heads constructed with rocking bearings at points removed from the axes of the bolts through which the bolts bear against the parts to be sustained and said bolts having freedom of angular movement relatively to the parts against which they bear, the bearing surface of said heads embracing the bearing surface of the parts to be sustained.

2. A spring wheel comprising inner and outer wheel members, which move relatively under the load which the wheel sustains when in use, resilient supporting means comprising bolts yieldingly connecting the wheel members having circumferentially continuous rocking bearings radially removed from the axis of the bolt and bearing elements connecting said bolts with said wheel members, said elements having circular bearing tracks to which the circumferentially continuous rocking bearings of the bolts are fitted and which they surround.

3. A spring wheel comprising inner and outer wheel members moving relatively under the load which the wheels sustains when in use, resilient sustaining means for said wheel members comprising bolts yieldingly connecting said members in sustaining relation one to the other but having freedom of angular movement relative to said members, and springs interposed between the bolts and the members from which the bolts are supported; said bolts being constructed with a circumferentially continuous rocking bearing radially removed from the axis of the bolt and the parts against which the bolts bear being provided each with a circular bearing track surrounded by said rocking bearing.

4. A spring wheel comprising outer and inner wheel members having overlapping parts moving relatively under the load which the wheel sustains when in use; bolts extending through said overlapped parts normally transversely to the plane of the wheel but having freedom of angular adjustment rela-

tively to the wheel members and compression springs interposed between each bolt and a wheel member, permitting freedom of angular movement of the bolt relatively thereto; the bolt having bearings at its ends through the medium of radially displaced circumferentially continuous rocking bearings which surround the contact surfaces of said wheel members and the spring respectively.

5. A spring wheel comprising members moving relatively under the wheel load and resilient connections having bolts and adapted to yieldingly resist such relative movement, said bolts having freedom of angular movement relatively to the wheel members and constructed with rocking and rolling heads through which the load is transmitted to and from the bolts, constructed to develop a center of rocking movement radially removed from the axis of the bolt, said rolling heads having bearing surfaces surrounding the corresponding bearing surfaces of said wheel members.

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