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INDEPENDENT WHEEL SUSPENSION CAPABLE OF YIELDING ABOUT A SUBSTANTIALLY VERTICAL AXIS

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Fig. 1.

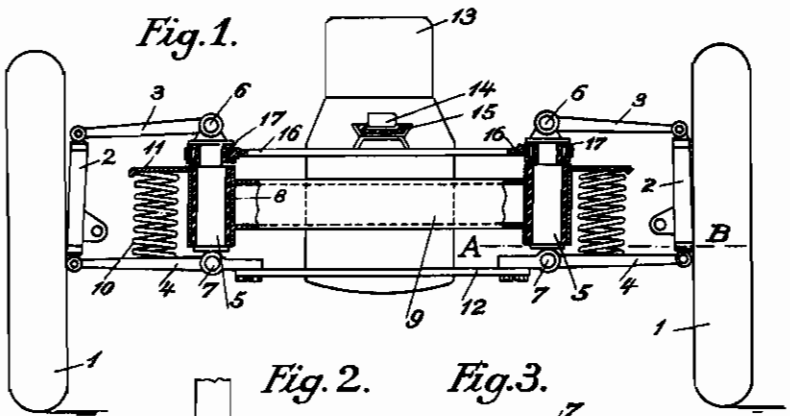


Fig. 2.

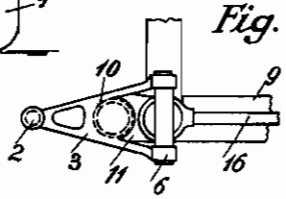


Fig. 3.

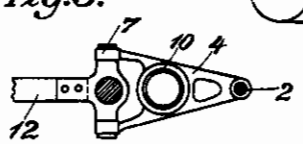


Fig. 4.

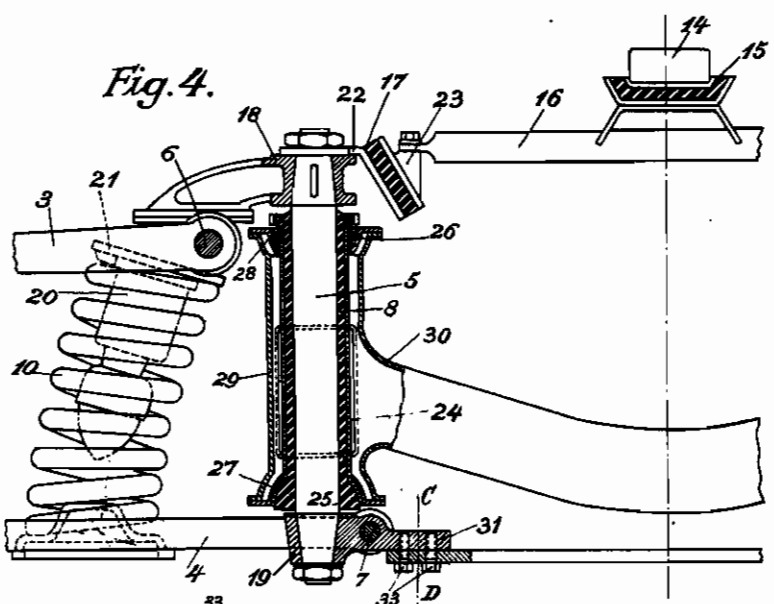


Fig. 6.

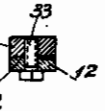
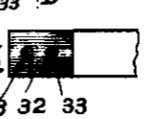


Fig. 5.



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ALIEN PROPERTY CUSTODIAN

INDEPENDENT WHEEL SUSPENSION CAPABLE OF YIELDING ABOUT A SUBSTANTIALLY VERTICAL AXIS

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The present invention relates to an independent wheel suspension capable of yielding about a substantially vertical axis. More particularly, the invention relates to an independent wheel suspension of a pair of wheels, especially wheels of a motor car in which the suspension of at least two wheels may somewhat yield relatively to the frame about a substantially vertical axis. The invention substantially consists in supporting the wheel suspensions against each other in the direction of rotation about the vertical axis. The supporting for instance may be effected by connecting together the supporting members of a pair of wheels, the supporting members being yieldably mounted about a substantially vertical axis of rotation and serving for mounting the wheel suspension members for instance two guide links arranged one above the other, the supporting members being rigidly connected to each other in the direction of rotation by a transverse member somewhat resilient in itself. The transverse member preferably is arranged substantially in the plane extending through the vertical axis of rotation of the two supporting members.

In a particular suitable construction one or more flat irons or spring leaves, arranged substantially horizontally and therefore under strain of bending acting around their edge ways, are provided for connecting to each other and sustaining the supporting members about their vertical axes of rotation.

Such a sustaining of the supporting members for the wheel suspension resiliently mounted at the vehicle, preferably at the frame, has the advantage that the frame will substantially be released of all forces acting in their horizontal plane upon the wheels and thereby upon the supporting members, and that viz. additional bending moments are obviated which occur at other points of the frame by sustaining the supporting pivots in a horizontal plane. Simultaneously the strains acting in a horizontal plane upon both wheel suspensions of a pair of wheels are rendered more uniform which is particularly favorable in case of steered wheels. The sustainment of the supporting members by one or several horizontally arranged spring leaves, moreover, results in the most simple sustainment and simultaneously in a particular low weight.

The invention, moreover, relates to a wheel suspension in which the supporting members for the wheel suspension, arranged at both sides of the longitudinal centre plane of the vehicle in a manner capable of elastically yielding in all directions, for instance substantially vertical supporting pivots each serving for mounting two guide links—or at least one of them—arranged one above the other, are supported against each other by two transverse members located one above the other. Thereby the two oppositely arranged supporting pivots are sustained with regard to each other in the manner of a parallelogram so that the forces occurring at the one supporting pivot simultaneously are absorbed by the other supporting pivot also. Thereby the supporting pivots as well as the frame are in an advantageous manner released from all strains occurring. The result of wheel pressures and shocks acting in a vertical direction upon the wheels is that the upper transverse member substantially is under strain of pressure and the lower transverse member substantially is under strain of tension. Preferably at least one of the transverse members simultaneously serves the purpose of sustaining the supporting members with regard to each other in horizontal direction. To this end e. g. one of the two transverse members, more particularly the lower transverse member, preferably is resilient in itself and rigidly coupled to the supporting members in the direction of rotation about a vertical axis, whereas the other, particularly the upper transverse member, may in the direction of rotation be linked or resiliently connected to the supporting members. The latter hereby simultaneously may serve for mounting the motor or other elements of the vehicle, e. g. of the differential.

In the accompanying drawing some embodiments of wheel suspensions according to the invention are shown by way of example.

In this drawing:

Fig. 1 is a diagrammatic view of a front axle according to the invention,

Fig. 2 shows a plan view of the means for guiding the left-hand wheel,

Fig. 3 is a plan view in section on the line A—B of Fig. 1 showing the means for guiding the right-hand wheel,

Fig. 4 shows a modification of a wheel suspension according to the invention on a larger scale and partially in section,

Fig. 5 is a plan view of the one end of a transverse member to be described later on, and

Fig. 6 is a section on the line C—D of Fig. 4.

In the construction shown in Fig. 1, the dirigible wheels 1 are carried by the wheel supports 2 which are connected by an upper link 3 and a lower link 4 as well as by joints 6 and 7 respectively to a vertical supporting pivot 5.

The latter is mounted for instance by means of a rubber sleeve 8 in the frame 9 of the vehicle, the rubber sleeve allowing yielding of the supporting pivot mainly about its vertical axis, but in another direction also. To provide the wheel with springs, a coiled spring 10 for instance is provided which is not guided and the ends of which on the one hand bear against the lower link 4 and on the other hand against a bearing bracket 11 provided for example at the frame. To absorb the forces which tend to swing the wheel suspension about the axis of the supporting pivot 5, a flat iron or leaf spring which in a horizontal plane is somewhat resilient, is provided which connects the two supporting pivots 5 to each other at both sides of the longitudinal centre plane of the vehicle and preferably is arranged in the plane of these supporting pivots.

According to the invention the motor 13, moreover, is mounted upon a transverse member 16 for instance by a front bearing eye 14 and an interposed rubber buffer 15. The transverse member 16 connects the upper ends of the supporting pivots 5 to each other. Between the transverse member 16 and the supporting pivots 5 other rubber blocks 17 are provided which allow the required freedom of movement between the supporting pivots 5 and the motor. The transverse member 16 also preferably is somewhat elastic, more particularly capable of being elastically bent, whereby the mutual influencing of motor and wheel suspension is further reduced. To increase the resiliency the transverse member 16 may correspondingly be curved instead of being straight lined.

In the modification shown in Fig. 4, the elements also illustrated in Figs. 1–3 are designated with the reference characters used in Figs. 1–3 for such elements. In this case the two bearing members 18 and 19 are rigidly mounted upon the supporting pivots 5. The bearing member 18 serves for mounting the upper link 3 and the bearing member 19 for mounting the lower link 4. Moreover, a shock absorber 20 as well as an abutment 21 for the coiled spring 10 are arranged at the upper bearing member 18.

Fixed upon the upper end of the supporting pivot 5 is an angle iron 22 which by way of the interposed rubber block 17 is adherently connected to another metal member 23. Connected to the latter is the transverse member 16 which is capable of being elastically bent and which is carrying the motor. The arrangement hereby is such that the rubber block 17 of substantially rectangular cross section is between the connecting surfaces obliquely inclined downwardly towards the centre longitudinal plane of the vehicle. The forces due to the weight of the motor or other forces acting in a vertical direction, therefore, substantially are absorbed by the rubber blocks 17, whereas the rubber block 15 which for instance in a manner known per se also is arranged between metal elements and adherently connected to the latter allows substantially torsional vibrations of the motor about its longitudinal axis. Vertical vibrations are, moreover, absorbed by the transverse member 16 capable of being somewhat elastically bent. The resilient members 15, 16, 17 arranged between the motor 13 and the supporting pivots 5 are of sufficient resiliency in horizontal direction to allow the required yielding of the supporting pivot 5, particularly the yielding about the vertical axis of the pivot, and to prevent shocks occurring at the wheel suspension to be transferred to the motor which would be highly undesired.

To ensure a safe mounting of the supporting pivot 5 on the frame allowing an adjustment, the rubber sleeve 8 surrounding the supporting pivot is inserted in a metal sleeve 24 which by means of a ball-like end surface 25 and a ball-like intermediate ring 26 respectively bears against ball-like bearing caps or covers 27 and 28 which are mounted upon the open ends of a vertical frame sleeve 29. The latter in turn is arranged at the point of connection of a transverse beam 30 of the frame to a longitudinal beam of the frame which for instance may also be of tube- or box-like form. The frame sleeve 29 is welded to these frame beams to form a solid unit with same.

As may be seen from Fig. 4, the lower transverse member 12, formed as a flat iron or as a spring leaf and serving to sustain the two supporting pivots relatively to each other, is rigidly connected to the bearing member 19 for the lower guide link 4. Accordingly the bearing member 19 has an inwardly directed flange 31, the lower surface of which is at 32 toothed or chequered in the longitudinal direction of the transverse member 12. The end of the transverse member 12 also is correspondingly toothed or chequered. By screws 33 the transverse member 12 is strongly pressed against the flange 31 of the bearing member 19 so that by means of the toothed or chequered part 32 a rigid coupling between these two parts is obtained in the direction of rotation about the axis of the supporting pivot 5.

Yielding of the wheel suspension about the vertical axis of the supporting pivot 5, therefore, is possible only by a bending of the transverse member 12 in a horizontal plane, i. e. by bending forces acting around the edge way of the spring leaf 12.

Thereby the required relatively slight resiliency of the wheel suspension in a horizontal plane is ensured on the one hand and too large a resiliency in this plane, however, is prevented on the other hand.

By the use of a spring leaf for supporting, a particular low weight and a special large simplicity of the supporting members is obtained.

As the two supporting pivots 5 are directly sustained with regard to each other by means of the transverse member 12, the frame is released from the supporting forces of the wheel suspension in horizontal plane.

The arrangement of the lower transverse member 12 and the upper transverse member 16 effects supporting of the two oppositely arranged elastically arranged supporting pivots 5 in the manner of a parallelogram so that under the action of the wheel pressure the upper transverse member 16 is under strain of pressure, whereas the lower transverse member 12 is under strain of tension.

If wanted the supporting pivots may be sustained with regard to each other about vertical axes by separate supporting arms for each of the supporting pivots for instance in such a manner that the bearing member 19 of the left-hand supporting pivot bears against the bearing member 19 of the right-hand supporting pivot and vice versa, rubber being interposed between the bearing member and the corresponding connecting member (12). Instead of a spring leaf capable of being bent around its edge way, any other suitable resilient device, for instance a sufficiently stiff leaf spring with vertically arranged spring

leaves, or for instance a torsional spring mounted on the frame may be used which by means of suitably interconnected lever arms are actuated by the supporting pivots resiliently mounted about a vertical axis of rotation in such a manner that a rotation of the one supporting pivot tends to effect rotation of the other supporting pivot in opposite direction.

It is understood that the wheel suspension members also may be mounted e. g. upon an U-shaped forging instead of on the supporting pivots above described.

Also the rigidity against torsion of the connection between elastic member and support member may be secured in another manner, e. g. the lower transverse member 12 may be a one piece forging with the bearing members 19; or there may be arms, forged as one piece with members 19 and yieldably, as by interposed rubber, supported by the frame.

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