J. W. RIDGWAY.

SUSPENSION DEVICE.

APPLICATION FILED OCT. 31, 1911.

1,209,205.

Patented Dec. 19, 1916.

4 SHEETS—SHEET 1.

Fig. 2

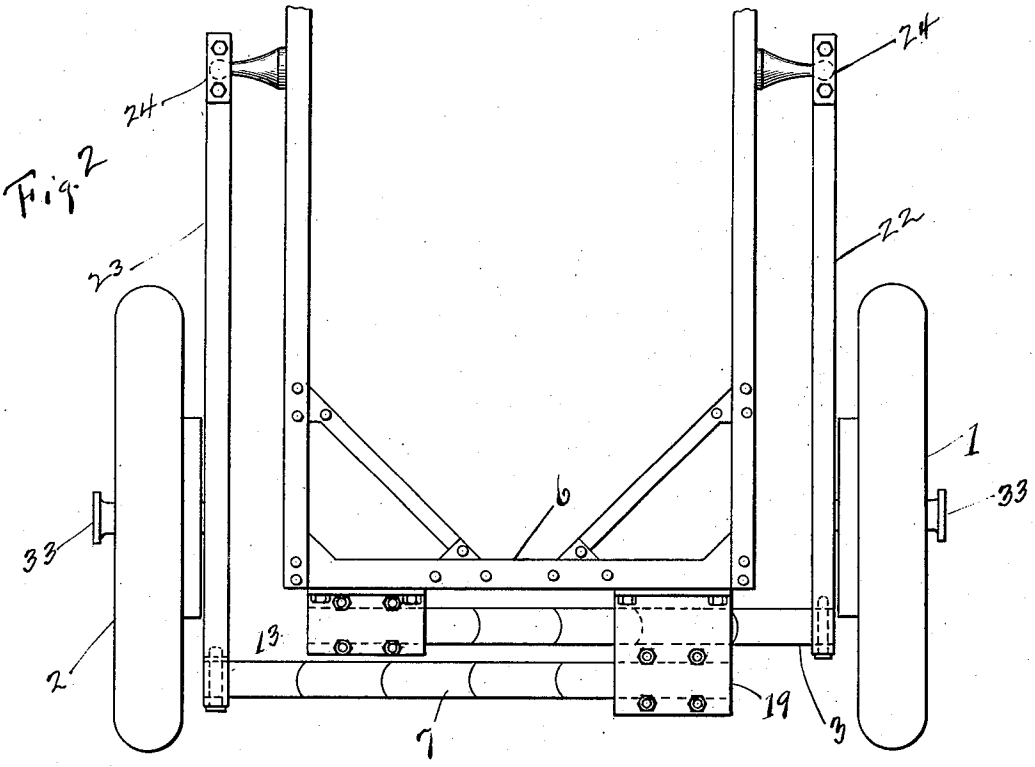
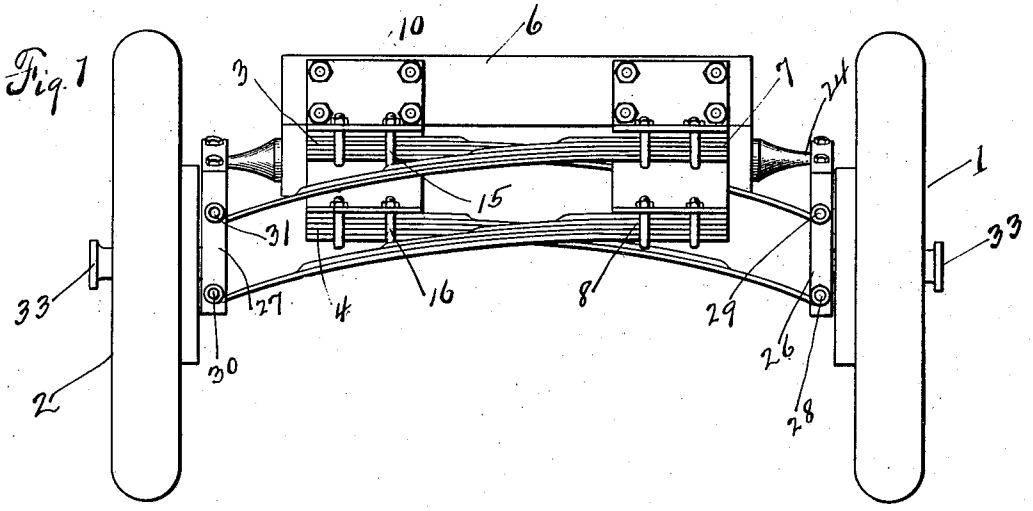


Fig. 1



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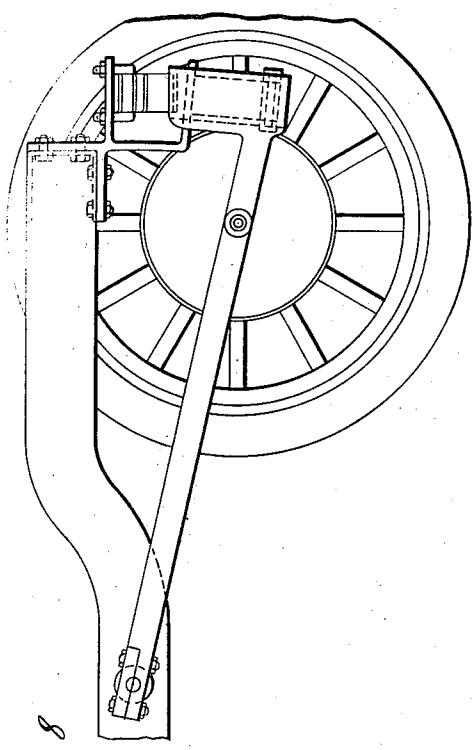


Fig. 7

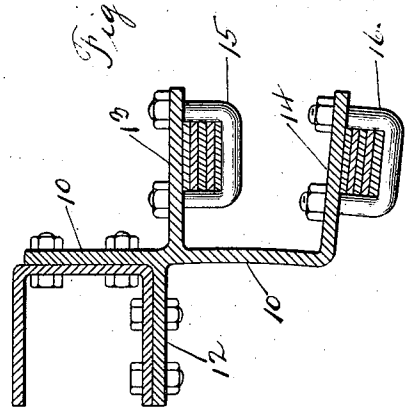


Fig. 2

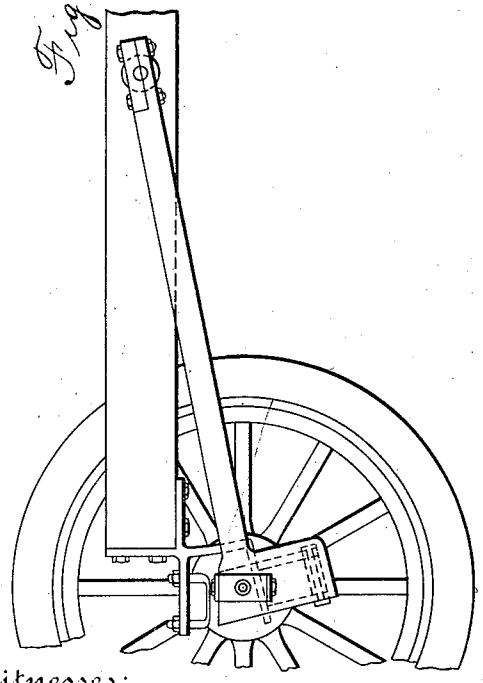
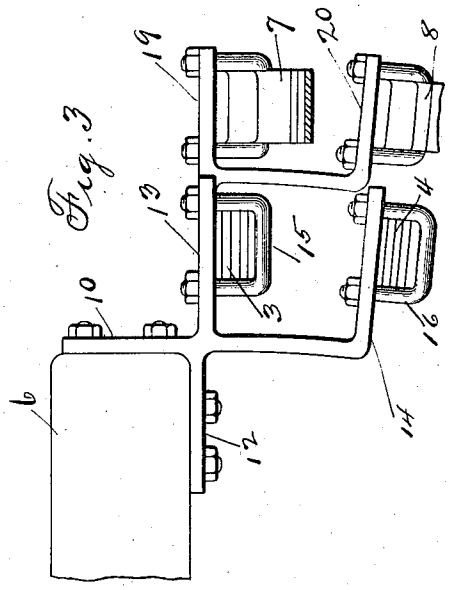


Fig. 3



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4 SHEETS—SHEET 3.

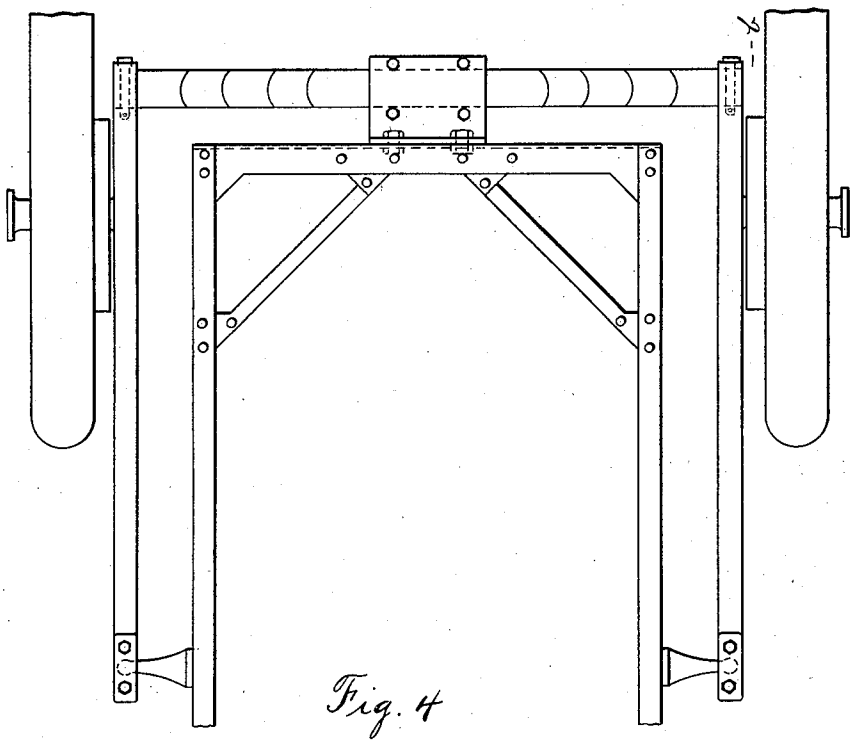
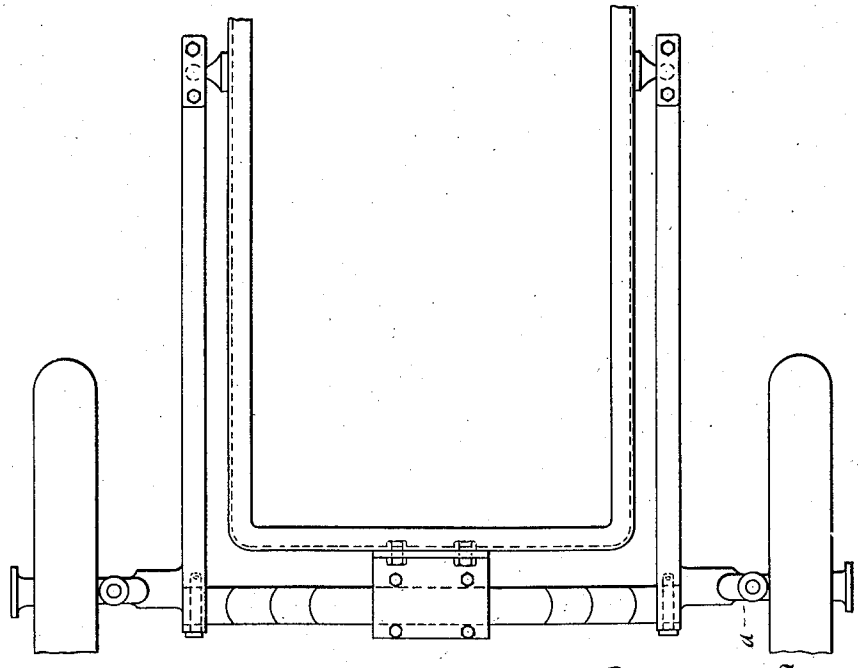


Fig. 4



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4 SHEETS—SHEET 4.

Fig. 6

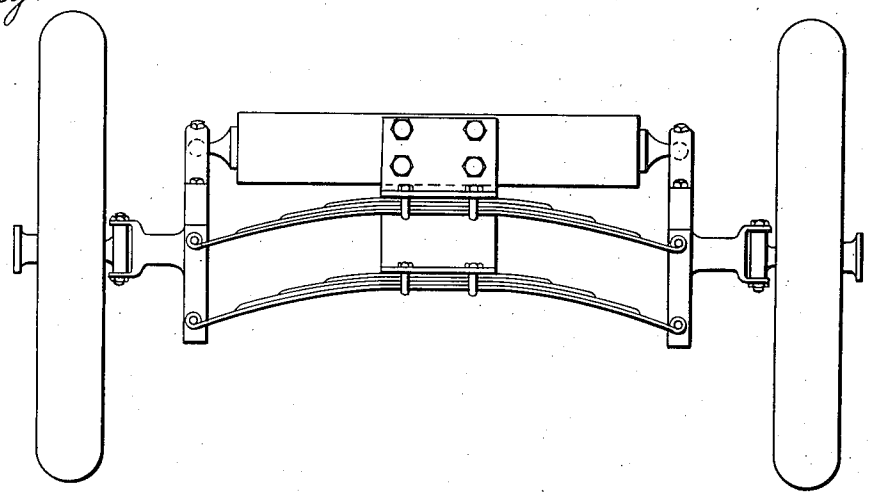
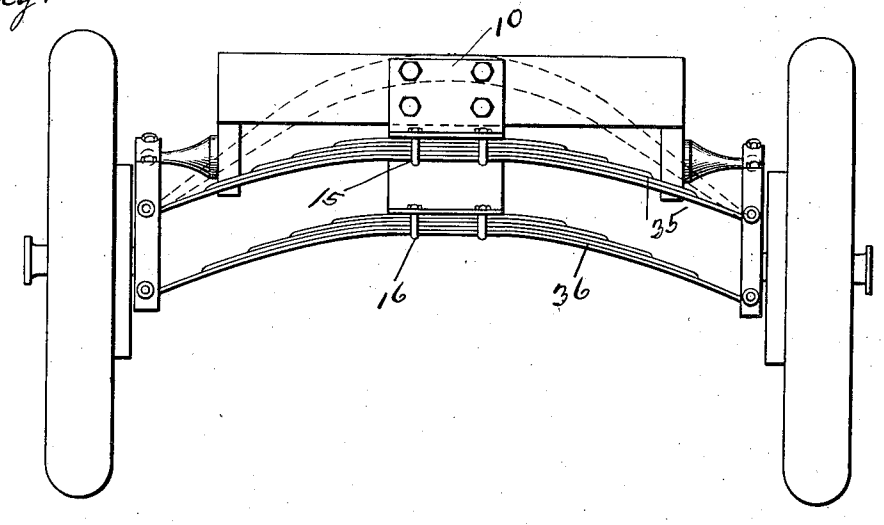


Fig. 5



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UNITED STATES PATENT OFFICE.

JOSEPH W. RIDGWAY, OF LONG ISLAND CITY, NEW YORK.

SUSPENSION DEVICE.

1,209,205. Specification of Letters Patent. Patented Dec. 19, 1916.

Application filed October 31, 1911. Serial No. 657,786.

To all whom it may concern:

Be it known that I, JOSEPH W. RIDGWAY, a citizen of the United States, and a resident of Long Island City, county of Queens, State of New York, have invented certain new and useful Improvements in Suspension Devices, of which the following is a specification.

The invention relates to suspension devices; and, while it may be embodied in constructions adapted for various purposes, it is more particularly applicable to vehicles, such as motor-cars and the like.

An object of the invention is to provide an improved device of the character referred to which shall be simple and durable and inexpensive in construction.

It is also an object of the invention to provide a vehicle suspension in which the load not directly carried through springs shall be at the minimum, and in which a road wheel shall be free to move under the influence of road inequalities without directly affecting the position of the opposite road wheel or its support, or moving the vehicle body or frame laterally to its direction of motion.

These and other objects of the invention will in part be obvious and in part be more fully explained in the following description.

The invention consists in the novel parts, combinations, improvements, and features of construction herein shown and described.

In the drawings, which are referred to herein and form a part hereof, are illustrated two embodiments of the invention, the same serving in connection with the description herein to explain the principles of the invention.

Of the drawings: Figure 1 is a rear elevation of part of a motor car, showing an embodiment of the invention as applied thereto; Fig. 2 is a plan view of the same, parts being broken away; Fig. 3 is a side elevation of the spring blocks or devices, shown in Fig. 1, for attaching the springs to the chassis; Fig. 4 is a plan view of a chassis, parts being broken away, showing a modification of the invention as applied thereto; Fig. 5 is a rear elevation of the same; Fig. 6 is a front elevation thereof; Fig. 7 is a side elevation of the spring block shown in Figs. 4 to 6; and Fig. 8 is a longitudinal section taken on the line *a*—*b* of Fig. 4, parts being broken away.

A vehicle suspension constructed in accordance with certain features of the invention comprises in combination, an elastic member fastened to the frame of the vehicle, and a suspension member pivotally connected to said frame and engaging with said elastic member, said suspension member being adapted to support an axle.

A vehicle suspension constructed in accordance with another feature of the invention comprises in combination, an elastic member fastened to the frame of the vehicle and arranged transversely thereof, and a pair of suspension members pivotally connected one to each longitudinal side of said frame and engaging the opposite ends of said elastic member, and a stub axle arranged on each of said suspension members. In one embodiment of this feature of the invention said elastic member comprises a pair of leaf springs loosely engaged at their opposite ends by said suspension members, respectively, said suspension members comprising side or radius bars pivotally connected at their opposite ends to the outside of the frame of the vehicle. On each side rod is mounted a stub axle at a point between the pivotal connection of the bar with the frame and the point of engagement of the bar with the spring.

Referring now in detail to the drawings, there is illustrated in Figs. 1, 2, and 3 one embodiment of the invention, the same being shown as applied to a vehicle of the motor car type. In the usual motor car construction the axle or its equivalent extends transversely of the body of the car and has mounted on its opposite ends wheels which are rigidly held in relation to each other. The axle usually carries the differential or balance gearing and often the transmission gearing in addition to the springs which are ordinarily rigidly affixed to the axle. The weight of this mass causes the rapid destruction of the road wheels and tires and causes the vehicle to ride hard owing to the momentum acquired by such mass in traversing road inequalities. Should the road inequalities occur under one wheel only, the effect is communicated to the whole axle assembly and the opposite wheel and spring, one end of the axle being raised or lowered and so tilting the opposite road wheel out of its plane of revolution, and moving the vehicle body laterally with relation to its direction of progress. In overcoming these defects in the said illustrated embodiment of the invention means are provided where-

by the motion transmitted by any road wheel to the body of the vehicle and to its opposite wheel is reduced to the minimum, and to this end said means are of such nature that the motion communicated by a road wheel, as for instance the wheel 1, to the body of the vehicle is transmitted by an elastic or cushioning element and is then independently communicated from said body to the opposite wheel 2. As shown, an elastic or cushioning element is provided, the same comprising a pair of springs 3, 4 which are rigidly secured to the chassis 6 of the car at the end opposite to the wheel 1 by a suitable fastening device and receive the motion from said wheel 1 through certain connections, said fastening device and said connections being presently described. Any motion communicated from the said body 6 to the said opposite wheel 2 is then transmitted through another similar member comprising springs 7, 8 which are rigidly fastened to the chassis 6 at the end opposite said wheel 2 by a fastening device similar to the one already referred to, and connections between said springs 7, 8 and wheel 2 are provided similar to those between the springs 3, 4 and wheel 1. While, so far as certain other features of the invention are concerned, any suitable means for fastening said springs to the chassis may be employed, preferably and as shown, a spring block is utilized, the same comprising a vertical plate 10 rigidly secured as by bolts, preferably and as shown, to the rear wall of the chassis, and a horizontal inwardly extending plate 12 rigidly secured as by bolts to the bottom of the chassis. Extending outwardly from the vertical plate 10 are two horizontal plates 13, 14 depending from which are yokes 15, 16, respectively, which, as shown, being threaded at their upper ends and provided with nuts, securely hold the ends of the springs 3 and 4, respectively. It is to be noted that as many of these horizontal plates may be provided as are necessary to meet any particular requirements. Another spring block is provided for the springs 7, 8, the same, as shown in Figs. 1 and 3, differing from the spring block just described only in the particular that the plates 19, 20, extend outwardly a greater distance than the plates 13, 14 in order that the springs 7, 8 may have sufficient clearance of the springs 3 and 4.

Another feature of the invention resides in the connections provided between the elastic element and the road wheels. While these connections may be made in divers ways, preferably and as shown, they comprise members for suspending the vehicle, the same, as shown, consisting of side or radius bars 22, 23. While these radius bars may be mounted on the body of the vehicle in various locations and ways, preferably and as shown, they are respectively mounted on the outer opposite sides of the chassis at points near the middle thereof by means of universal joints 24 and extend rearwardly a suitable distance to connect with the springs 3, 4 and 7, 8. Preferably, said rods have upwardly projecting ends 26, 27 of suitable dimensions, and the springs are connected therewith by their ends forming eyes and engaging with eye bolts 28, 29 and 30, 31, respectively, suitably arranged in said projecting ends, this arrangement being of advantage in the movements of the springs.

Suitable means are provided for mounting the road wheels, and further to overcome the defects of the ordinary construction, as heretofore noted, the embodiment of the invention now being described contemplates mounting the road wheels without the aid of the ordinary axle which extends transversely of the vehicle and holds the opposite wheels in rigid relation to each other. While, therefore, the road wheels may be mounted in various ways, in the embodiment illustrated stub axles 33 are mounted on the radius bars 22, 23, preferably, at a point between the universal joints 24 and the members 26, 27. It will be seen that with this construction a wheel is permitted to move vertically with very little tendency to move the vehicle laterally. It will also be noted that the weight of the apparatus not directly borne by the springs is greatly reduced and the weight of the mass immediately affected by road inequalities is also greatly reduced.

Another embodiment of the invention is illustrated in Figs. 4 to 8, inclusive. In this embodiment, see Figs. 5 and 6, two springs 35, 36 are used instead of the four springs shown in the embodiment heretofore described, each of these two springs extending completely across the body of the vehicle and being fastened at its center portion to a spring block which is secured to the chassis midway of the rear wall. It will be observed that either the upper or lower spring may be made strong enough to support the weight of the vehicle and in such case the other spring can be replaced by suitable means, as a linkage, which will act in place of said other spring in supporting the radius rod in its approximately vertical plane, but which need not carry any of the weight of the vehicle. It will also be observed, see Fig. 5, that the springs 35 and 36 have approximately the same curvature and should they be subjected to additional stress, the distance between opposite suspension members, and hence the width of the vehicle tread will be increased. Should the upper spring have a greater curvature, as indicated in dotted lines in said Fig. 5, the distance under the increased load between

the suspension members will be increased more at the points of attachment of said upper spring than in the plane of the attachments of the lower spring. It will be seen that this will act to tilt the wheels outwardly and so keep the distance between the wheels at points of contact with the road approximately uniform under varying conditions of road and load pressure.

It is obvious that the invention may be applied to the front wheels of a vehicle, the embodiment of the invention last described being shown in Figs. 4, 6, and 8 as applied to the front or steering wheels of a motor car.

It will be seen that a vehicle suspension constructed in accordance with this invention carries out the objects of the invention, and, while possessing the advantages herein described or referred to, has other advantages which will be apparent to those skilled in the art.

The invention in its broader aspects is not limited to the particular constructions shown and described as many changes may be made in the details thereof without departing from the main principles of the invention and without sacrificing its chief advantages.

I claim:

1. A vehicle suspension including, in combination, a chassis, wheels therefor mounted on stub-axles, and resilient supporting means independently connecting each stub-axle with a side of the chassis remote from its own wheel.

2. A vehicle suspension including, in combination, a chassis, radius bars jointed to opposite sides thereof, resilient supporting members transversely secured to said chassis each by one end and attached each to one of said bars at the other end, stub-axles carried by the bars, and road wheels mounted on said stub-axles.

3. A vehicle suspension including, in combination, a pair of road wheels, radius bars carrying stub-axles upon which said wheels are mounted, a chassis intermediately jointed to said bars, and resilient supporting members secured to the latter and to opposite sides of said chassis respectively.

4. A vehicle suspension including, in combination, a pair of road wheels mounted on stub-axles, radius bars carrying the latter, resilient supporting members respectively attached at one end to said bars and projecting toward the opposite stub-axles at the other end, a chassis secured to the projecting ends of said members, and flexible connections between the radius bars and said chassis.

5. A vehicle suspension including, in combination, a pair of road wheels, stub-axles therefor, radius bars projecting on substantially parallel lines from said stub-axles, crossed springs attached one to each of said bars but terminating short of the other bar between said wheels, a chassis resting upon the crossed portions of said springs, and universal joints between opposite sides of said chassis and the radius bars.

6. In a vehicle suspension, the combination of a member pivoted to one side of the vehicle frame and adapted to mount a wheel, and a spring connected at one end to said member and extending transversely of and being secured at its other end to said frame near the side opposite said member.

7. In a vehicle suspension, the combination of a member pivoted to one side of the vehicle frame and adapted to mount a wheel, and an elastic member connected at one end to said member and extending transversely of and being secured at its other end to said frame near the side opposite said member.

8. In a vehicle suspension, the combination of a pair of members each pivoted to one side of the vehicle frame and adapted to mount a wheel, and a pair of springs extending transversely of said frame in opposite directions, each spring being connected at one end to one of said members, and being secured at its other end to said frame near the side opposite said member.

9. In a vehicle suspension, the combination of an elastic member secured to the vehicle frame transversely thereof, and a connecting element between each of the opposite ends of said elastic member and said frame, each said element being adapted to mount a wheel, and said elastic member and said elements being so arranged that the upper portions of the wheels mounted on said elements will tilt outwardly under increased pressure.

10. In a vehicle suspension, the combination of a pair of springs arranged transversely of the frame of the vehicle and fastened thereto one above the other, the upper of said springs having a curvature greater than the curvature of the lower spring, and connections between said springs and the running gear, whereby the upper portions of the wheels having connections with said springs will tilt outwardly under increased pressure.

11. In a vehicle suspension, the combination of an elastic member fastened to the frame of the vehicle, a pair of suspension members pivotally connected one to each longitudinal side of said frame, said suspension members being arranged to support an axle, and an extensible member arranged between said suspension members in a different horizontal plane from that of said elastic member.

12. In a vehicle suspension a member for fastening an elastic member to the frame of the vehicle, said fastening member comprising an upwardly extending plate adapted to

be fastened to said frame, and a plurality of outwardly projecting horizontal flanges one approximately overlying another and adapted to have elastic members fastened thereto.

13. In a vehicle suspension means for fastening springs to the frame of the vehicle, said means comprising a vertical plate adapted to be fastened to the said frame, an inwardly extending horizontal flange adapted to be fastened to the bottom of the frame, a plurality of outwardly extending horizontal flanges occupying relatively different planes, and yokes for fastening the springs to said outwardly extending flanges.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOSEPH W. RIDGWAY.

Witnesses:
FRANCES KINREICH,
R. R. MURPHY.