No. 891,328. PATENTED JUNE 23, 1908.

I. COWLES & E. H. MacDOWELL.

VEHICLE.

APPLICATION FILED JUNE 11, 1906.

3 SHEETS—SHEET 1.

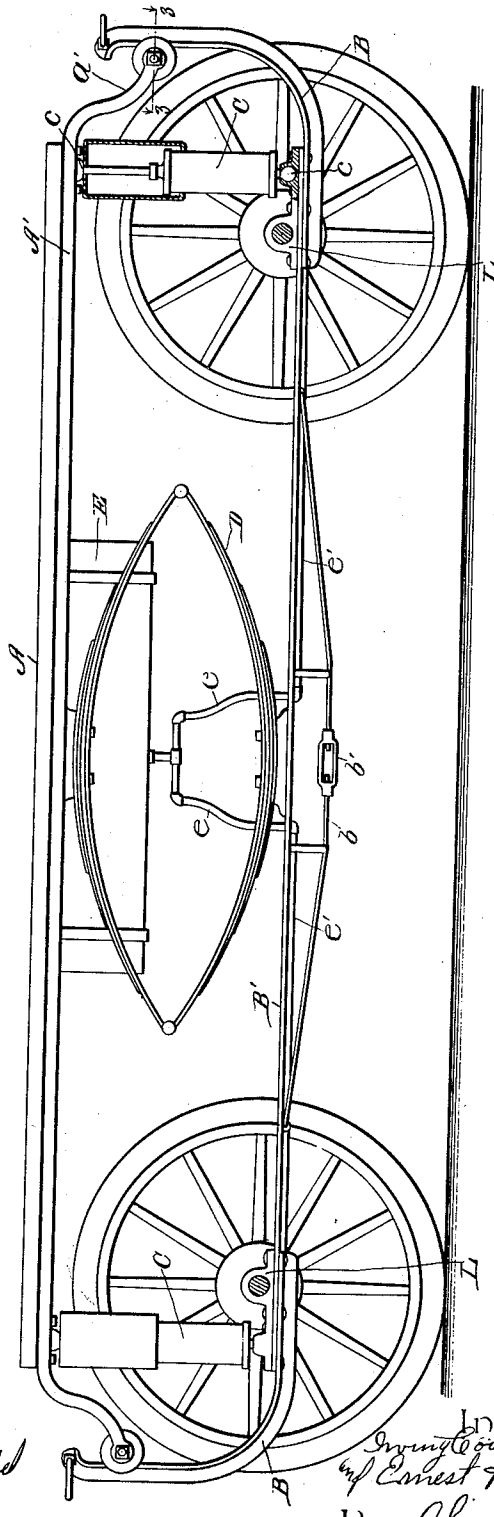


Fig. 1.

Witnesses:
Lulu G. Grunfeld
Clara E. Braden

Inventors:
Irving Cowles
and Ernest H. MacDowell
By Chappell & Earl
Att'ys

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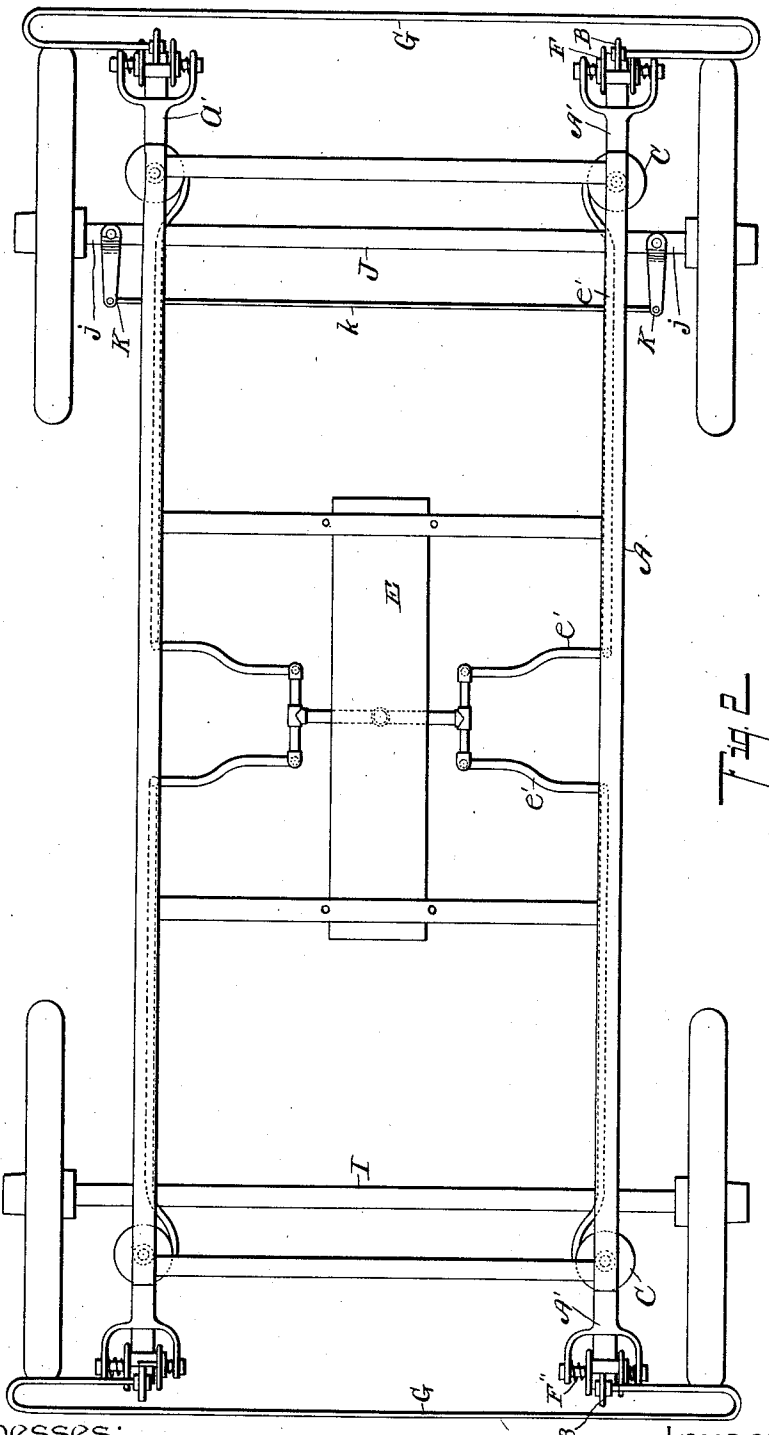


Fig 2

Witnesses:

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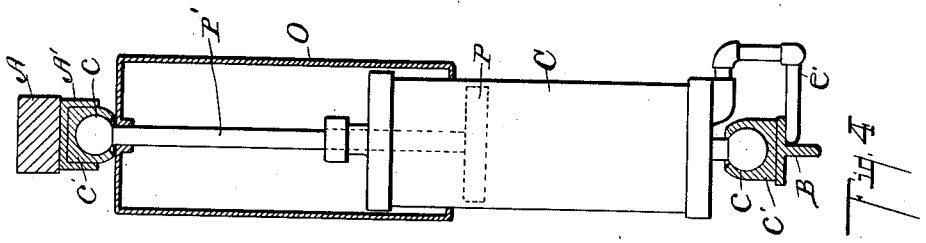


Fig. 4

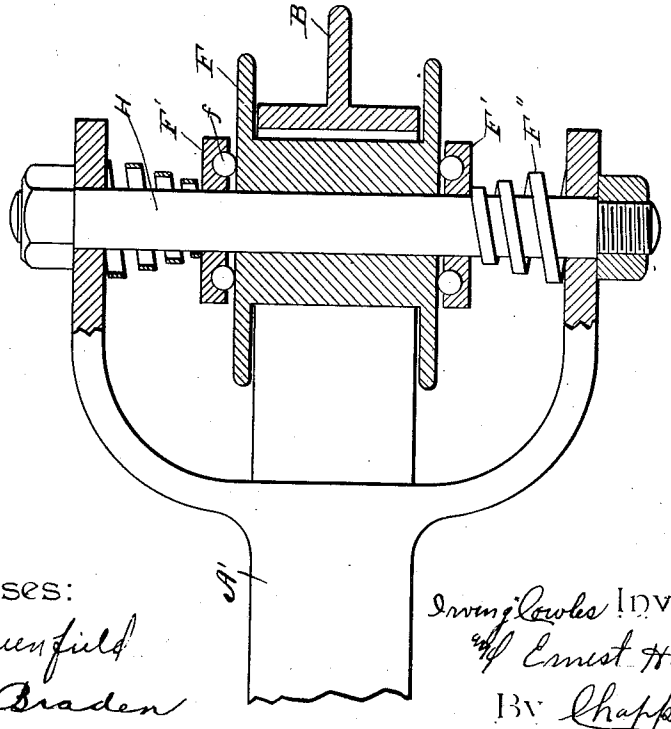


Fig. 5

Witnesses:
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By Chappell & Earl
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UNITED STATES PATENT OFFICE.

IRVING COWLES AND ERNEST H. MACDOWELL, OF SOUTH HAVEN, MICHIGAN.

VEHICLE.

No. 891,328. Specification of Letters Patent. Patented June 23, 1908.

Application filed June 11, 1906. Serial No. 321,178.

To all whom it may concern:

Be it known that we, IRVING COWLES and ERNEST H. MACDOWELL, citizens of the United States, residing at South Haven, county of Van Buren, State of Michigan, have invented certain new and useful Improvements in Vehicles, of which the following is a specification.

This invention relates to improvements in vehicles. These improvements are designed more particularly for motor cars such as automobiles, but are desirable and of advantage for use in various other relations.

The objects of this invention are: first, to provide an improved vehicle in which the body is supported by very elastic springs and at the same time one in which the body is very steadily and evenly carried. Second, to provide an improved vehicle in which the rocking and swaying of the body are reduced to a minimum. Third, to provide an improved vehicle in which the springs are very elastic and at the same time are capable of carrying very heavy loads without danger. Further objects, and objects relating to structural details will definitely appear from the detailed description to follow.

We accomplish the objects of our invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure embodying the features of our invention is clearly illustrated in the accompanying drawing forming a part of this specification, in which,

Figure 1 is a side elevation of a structure embodying the features of our invention, the wheels on one side being removed to better show the arrangement of parts, certain parts also being sectioned for that purpose. Fig. 2 is a plan of the structure appearing in Fig. 1. Fig. 3 is an enlarged detail section taken on a line corresponding to line 3—3 of Fig. 1 looking in the direction of the little arrows at the ends of the section lines. Fig. 4 is an enlarged view partially in section of one of the pneumatic spring devices.

In the drawing, similar letters of reference refer to similar parts throughout the several views.

Referring to the drawing, A represents the bed of the vehicle body. On the under side of the side rails or sills of the body are bars A′ having downward turned forked ends *a′*

The axles I and J are connected by side bars B′, which are extended beyond the axles into the upturned arm-like guide ways B. The side bars B′ are preferably of spring metal and the central parts thereof are provided with truss rods *b′*, the same being preferably formed in sections and connected by suitable turn-buckles as *b′*. The bars B′ are secured to the axles by clips L. Between the axle clips and the ends of the truss rods, the side bars have a slight spring quality.

Arranged between the body and the side bars preferably in a central position are double elliptic springs D. At each end, preferably at the rear of the rear axle and in front of the front axle are pneumatic spring devices substantially such as are illustrated and described in our application for patent on pneumatic spring devices, filed April 13, 1906, Serial No. 311,532, the same consisting broadly of cylinders C and plungers P, the cylinders being connected to the side rails by ball-and-socket joints, the socket members C′ being arranged on the side bars and body and the ball members on the cylinders and plunger rods, as clearly appears in Fig. 4.

Casings O are provided for the plunger rods P″, the lower ends of which embrace the cylinders and are adapted to reciprocate thereon. This protects the plunger rods from dust and dirt and also the plunger rod packing. The cylinders C are preferably connected to a common chamber or tank E by means of pipes *e*, *e′*, the plungers acting against the pressure in the tank E. The tank E is preferably partially filled with oil or other liquid, the liquid also filling the cylinders C below the pistons and the pipe connections for the cylinders to the tank, substantially as is described in our application for patent hereinbefore referred to. As the details of these connections form no part of this invention, we do not illustrate the same herein.

On the forked arms at the ends of the body are channeled rollers F which are arranged to engage and travel up and down upon the guide ways B. The rollers F are journaled on spindles H which are arranged through the forked ends of the side rails. At each side of the rollers F are coiled springs F″ which yieldingly hold the rollers F in a central position. The bearing plates F′ for the inner ends of the springs are provided with ball bearings for engaging the ends of the rollers thus reducing the friction. These

springs F″ are of sufficient strength to hold the body normally in position and at the same time allow it to move slightly from side to side.

The forward axle is provided with pivoted spindles J′ which are connected by means of the arms K and a suitable link *k*. The steering connections are not here illustrated.

By the arrangement of the parts we have illustrated and described, the vehicle body is supported so that the longitudinal rocking and the lateral swaying are reduced to a minimum, at the same time there is sufficient latitude of movement to remove any suggestion of stiffness or rigidity.

We preferably provide the upper ends of the ways with tie bars G which assist in supporting them, and the tie bars are also preferably arranged so that they extend outwardly at each side of the ways beyond the vehicle wheels, forming guards for the end of the vehicle.

While the particular spring construction shown is preferred by us, we desire to state that a great variety of springs may be used in this relation. The springs may be made very elastic and at the same time are not liable to be injured by rebounding or the like. And in the event of the breaking of a spring, the body is still supported so that no injury is likely to result thereto.

Further advantages will readily appear to those skilled in the art to which this invention relates. We have illustrated and described the same in detail in the form preferred by us, and on account of the structural simplicity and economy. We are aware, however, that it is capable of considerable variation in structural detail without departing from our invention.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a vehicle, the combination with the body; forked arms at each end of the body; axles; side bars connected to said axles; truss rods for the central portions of said side bars, the said side bars between the ends of the truss rods and axles being adapted to spring; upwardly projecting arm-like ways at the ends of the side bars; rollers having channeled rims adapted to engage said ways arranged in the forked arms on said body; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; tie bars for said ways extending outwardly at each side thereof beyond the vehicle wheels; centrally arranged double elliptic springs connected to said body and side bars; cylinders connected to said side bars by universal joints; plungers for said cylinders; plunger rods for said plungers connected to said body by universal joints; a tank or chamber; and connections for said tank or chamber to the lower ends of the said cylinders, substantially as described.

2. In a vehicle, the combination with the body; forked arms at each end of the body; axles; side bars connected to said axles; truss rods for the central portions of said side bars, the said side bars between the ends of the truss rods and axles being adapted to spring; upwardly projecting arm-like ways at the ends of the side bars; rollers having channeled rims adapted to engage said ways arranged in the forked arms on said body; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; centrally arranged double elliptic springs connected to said body and side bars; cylinders connected to said side bars by universal joints; plungers for said cylinders; plunger rods for said plungers connected to said body by universal joints; a tank or chamber; and connections for said tank or chamber to the lower ends of the said cylinders, substantially as described.

3. In a vehicle, the combination with the body; forked arms at each end of the body; axles; side bars connected to said axles; upwardly projecting arm-like ways at the ends of the side bars; rollers having channeled rims adapted to engage said ways arranged in the forked arms on said body; journals on which said rollers are slidably mounted; springs at each end of said rollers for yieldingly retaining the same in position; tie bars for said ways extending outwardly at each side thereof beyond the vehicle wheels; centrally arranged double elliptic springs connected to said body and side bars; cylinders connected to said side bars by universal joints; plungers for said cylinders; plunger rods for said plungers connected to said body by universal joints; a tank or chamber; and connections for said tank or chamber to the lower ends of the said cylinders, substantially as described.

4. In a vehicle, the combination with the body; forked arms at each end of the body; axles; side bars connected to said axles; upwardly projecting arm-like ways at the ends of the side bars; rollers having channeled rims adapted to engage said ways arranged in the forked arms on said body; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; centrally arranged double elliptic springs connected to said body and side bars; cylinders connected to said side bars by universal joints; plungers for said cylinders; plunger rods for said plungers connected to said body by universal joints; a tank or chamber; and connections for said tank or chamber to the lower ends of the said cylinders, substantially as described.

5. In a vehicle, the combination with the

body; forked arms at each end of the body; axles; side bars connected to said axles; truss rods for the central portions of said side bars, the said side bars between the ends of the truss rods and axles being adapted to spring; upwardly projecting arm-like ways at the ends of the side bars; rollers having channeled rims adapted to engage said ways arranged in the forked arms on said body; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; tie bars for said ways extending outwardly at each side thereof beyond the vehicle wheels; and suitable springs, substantially as described.

6. In a vehicle, the combination with the body; forked arms at each end of the body; axles; side bars connected to said axles; truss rods for central portions of said side bars, the said side bars between the ends of the truss rods and axles being adapted to spring; upwardly projecting arm-like ways at the ends of the side bars; rollers having channeled rims adapted to engage said ways arranged in the forked arms on said body; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; and suitable springs, substantially as described.

7. In a vehicle, the combination with the body; forked arms at each end of the body; axles; side bars connected to said axles; upwardly projecting arm-like ways at the ends of the side bars; rollers having channeled rims adapted to engage said ways arranged in the forked arms on said body; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; tie bars for said ways extending outwardly at each side thereof beyond the vehicle wheels; and suitable springs, substantially as described.

8. In a vehicle, the combination with the body; forked arms at each end of the body; axles; side bars connected to said axles; upwardly projecting arm-like ways at the ends of the side bars; rollers having channeled rims adapted to engage said ways arranged on the forked arms on said body; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; and suitable springs, substantially as described.

9. In a vehicle, the combination with the body; axles; side bars connected to said axles; truss rods for the central portions of said side bars, the said side bars between the ends of the truss rods and the axles being adapted to spring; vertical guide ways arranged at each end of the body; rollers arranged to engage said ways; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; tie bars for said ways extending outwardly at each side thereof beyond the vehicle wheels, forming guards for the ends of the vehicle; centrally arranged double elliptic springs connected to said body and side bars; cylinders connected to said bars by universal joints; plungers for said cylinders; plunger rods for said plungers connected to said body by universal joints; a tank or chamber; and connections for said tank or chamber to the lower ends of the said cylinders, for the purpose specified.

10. In a vehicle, the combination with the body; axles; side bars connected to said axles; truss rods for the central portions of said side bars, the said side bars between the ends of the truss rods and axles being adapted to spring; vertical guide ways arranged at each end of the body; rollers arranged to engage said ways; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; centrally arranged double elliptic springs connected to said body and side bars; cylinders connected to said bars by universal joints; plungers for said cylinders; plunger rods for said plungers connected to said body by universal joints; a tank or chamber; and connections for said tank or chamber to the lower ends of the said cylinders, for the purpose specified.

11. In a vehicle, the combination with the body; axles; side bars connected to said axles; vertical guide ways arranged at each end of the body; rollers arranged to engage said ways; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; tie bars for said ways extending outwardly at each side thereof beyond the vehicle wheels, forming guards for the ends of the vehicle; centrally arranged double elliptic springs connected to said body and side bars; cylinders connected to said bars by universal joints; plungers for said cylinders; plunger rods for said plungers connected to said body by universal joints; a tank or chamber; and connections for said tank or chamber to the lower ends of the said cylinders, for the purpose specified.

12. In a vehicle, the combination with the body; axles; side bars connected to said axles; vertical guide ways arranged at each end of the body; rollers arranged to engage said ways; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; centrally arranged double elliptic springs connected to said body and side bars; cylinders connected to said bars by universal joints; plungers for said cylinders; plunger rods for said plungers connected to said body by universal joints; a tank or chamber; and connections for said tank or chamber to the

lower ends of the said cylinders, for the purpose specified.

13. In a vehicle, the combination with the body; axles; side bars connected to said axles; truss rods for the central portions of said side bars, the said side bars between the ends of the truss rods and the axles being adapted to spring; vertical guide ways arranged at each end of the body; rollers arranged to engage said ways; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; tie bars for said ways extending outwardly at each side thereof beyond the vehicle wheels, forming guards for the ends of the vehicle; and suitable springs, for the purpose specified.

14. In a vehicle, the combination with the body; axles; side bars connected to said axles; truss rods for the central portions of said side bars, the said side bars between the ends of the truss rods and the axles being adapted to spring; vertical guide ways arranged at each end of the body; rollers arranged to engage said ways; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; and suitable springs, for the purpose specified.

15. In a vehicle, the combination with the body; axles; side bars connected to said axles; vertical guide ways arranged at each end of the body; rollers arranged to engage said ways; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; tie bars for said ways extending outwardly at each side thereof beyond the vehicle wheels, forming guards for the ends of the vehicle; and suitable springs, for the purpose specified.

16. In a vehicle, the combination with the body; axles; side bars connected to said axles; vertical guide ways arranged at each end of the body; rollers arranged to engage said ways; journals on which said rollers are slidably mounted; springs at each side of said rollers for yieldingly retaining the same in position; and suitable springs, for the purpose specified.

17. In a vehicle, the combination with the body, axles; side bars connected to said axles; truss rods for the central portions of said side bars, the said side bars between the ends of the truss rods and axles being adapted to spring; vertical guide ways arranged at each end of the body; rollers arranged to engage said ways; tie bars for said ways extending outwardly at each side thereof beyond the vehicle wheels, forming guards for the ends of the vehicle; and suitable springs, for the purpose specified.

18. In a vehicle, the combination with the body; axles; side bars connected to said axles; truss rods for the central portions of said side bars, the said side bars between the ends of the truss rods and axles being adapted to spring; vertical guide ways arranged at each end of the body; rollers arranged to engage said ways; and suitable springs, for the purpose specified.

19. In a vehicle, the combination with the body; axles; side bars connected to said axles; vertical guide ways arranged at each end of the body; rollers arranged to engage said ways; tie bars for said ways extending outwardly at each side thereof beyond the vehicle wheels, forming guards for the ends of the vehicle; and suitable springs, for the purpose specified.

20. In a vehicle, the combination of the running gear comprising front and rear axles; a pair of side bars connected to said axles; a vehicle body; a spring support therefor; vertically arranged guide ways on said running gear at each end of said body, and rollers carried by said body and arranged to engage said guide ways, whereby the longitudinal movement of said body is prevented, said rollers being yieldingly connected to said body, whereby said body is yieldingly supported against lateral movement.

21. In a vehicle, the combination with the body and running gear; suitable springs therefor; vertical guide ways carried by the running gear; rollers carried by the body arranged to engage said ways; journals on which said rollers are slidably mounted; and springs at each side of said rollers for yieldingly retaining the same in position, for the purpose specified.

22. In a vehicle, the combination with the running gear, of a vehicle body; supporting springs therefor; vertically arranged guide ways on said running gear at each end of said body, and rollers carried by said body and arranged to engage said guide ways, whereby the longitudinal movement of said body is prevented, said rollers being yieldingly connected to said body, whereby said body is yieldingly supported against lateral movement.

23. In a vehicle, the combination with the running gear, of a vehicle body; supporting springs therefor; vertically arranged guide ways on said running gear at each end of said body, and rollers carried by said body and arranged to engage said guide ways, whereby the longitudinal movement of said body is prevented.

24. In a vehicle, the combination with the front and rear axles, the front axle being provided with pivoted wheel spindles; a pair of side bars secured to said front and rear axles; truss rods for the central portions of said side bars, the portions of said bars between the ends of said truss rods and said axles being adapted to spring.

25. In a vehicle, the combination with the front and rear axles, the front axle being pro-

vided with pivoted wheel spindles; and side bars connected to said axles, said side bars having resilient or spring portions adjacent to the axles.

26. In a vehicle, the combination with the axles; side bars carried thereby; vertical guide ways disposed at the ends of said side bars; a body yieldingly supported, and anti-friction means carried by said body and engaging said guide ways to hold said body against longitudinal movement relative to said guide ways.

27. In a vehicle, the combination with the body of running gear; suitable springs supporting said body; vertical guide ways disposed on said running gear and confining said body therebetween to hold the same against longitudinal movement relative to said running gear; and rollers carried by said body and engaging said running gear, said rollers being laterally movable relative to said body.

28. In a vehicle, the combination with the body, of running gear; suitable springs supporting said body; vertical guide ways disposed on said running gear and confining said body therebetween to hold same against longitudinal movement relative to said running gear; rollers carried by said body and engaging said running gear, said rollers being laterally movable relative to said body; and means maintaining said rollers against lateral movement relative to said guide ways.

29. In a vehicle, the combination with the body of running gear; suitable springs supporting said body; vertical guide ways disposed on said running gear and confining said body therebetween to hold the same against longitudinal movement relative to said running gear; rollers carried by said body and engaging said running gear, said rollers, being laterally movable relative to said body; and springs disposed in operating relation to said rollers and said body to resist relative lateral movement thereof.

30. In a vehicle, the combination with the running gear equipped with vertical guides in which the body is movable and confining the latter longitudinally therebetween, and cushioning means disposed in operative relation to said guides and said body resisting relative lateral movement of the same.

In witness whereof, we have hereunto set our hands and seals in the presence of two witnesses.

IRVING COWLES. [L. S.]
ERNEST H. MACDOWELL. [L. S.]

Witnesses:
FRED C. COGSHALL,
G. J. WICKSALL.