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W. H. MANNING

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SPRING SUSPENSION

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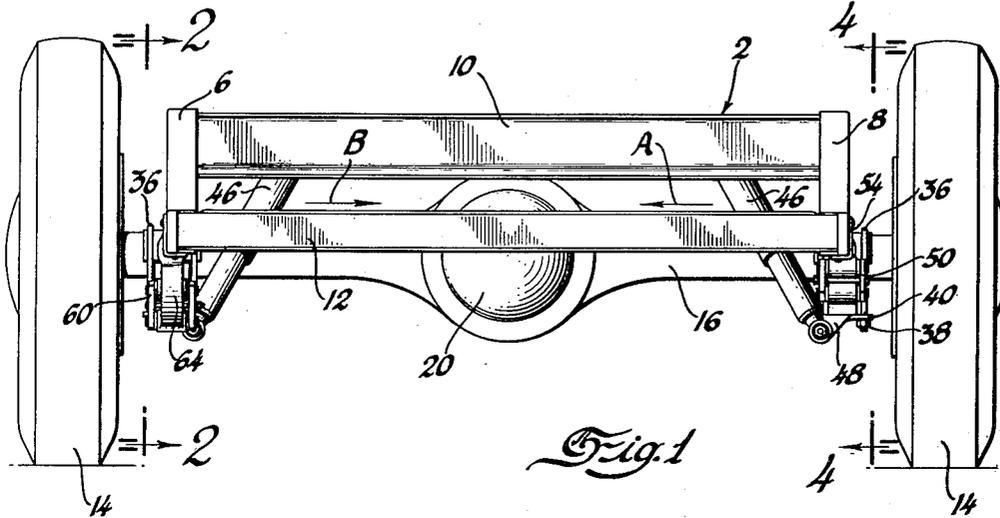


Fig. 1

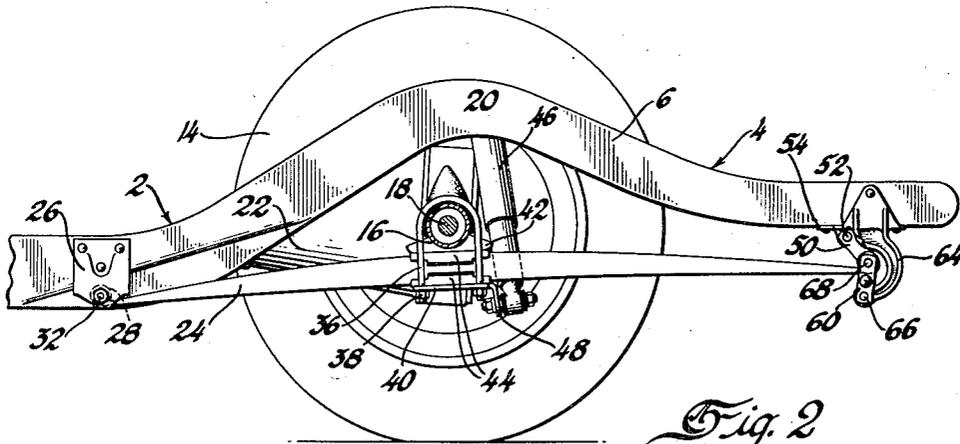


Fig. 2

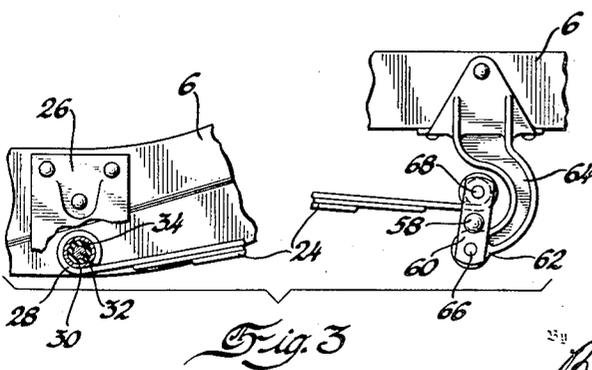


Fig. 3

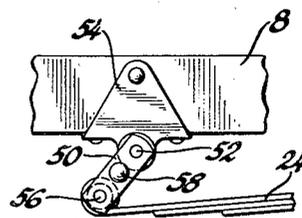


Fig. 4

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# UNITED STATES PATENT OFFICE

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## SPRING SUSPENSION

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3 Claims. (Cl. 267—36)

This invention relates to wheeled vehicles and has particular reference to the spring suspension of an automotive vehicle.

It is customary to use a leaf spring at each side of the vehicle to suspend the rear end of the frame from the axle, the leaf springs being attached to the frame by a pivot at one end and by a shackle at the other end. The shackles have been of the same type, either both in tension or both in compression.

With this prior art installation or mounting of the rear leaf springs, it has been found that when one wheel is caused to rise by passing over a projection in the road, this raising of the wheel will cause the springs to move with the axle and cause them to be given a twist. When looking from the rear end of the vehicle, if the left-hand wheel is raised, both springs will move in a clockwise direction which will transmit a corresponding movement to the spring shackles and this clockwise movement will transmit its force to the frame, both forces being then toward the right. Similarly, if the right-hand wheel is raised, the rotation of the springs will be in a counterclockwise direction and the movement of the shackles will also be counterclockwise so that the motion transmitted to the frame will be to the left and one side will add to the movement of the other side to give to the body what is known as cross shake, that is, a relative movement between the body and the wheels.

In order to obviate this cross shake, it has been found that if the shackle on one side is made a compression shackle and the shackle on the other side is forced to act in tension, this additive effect on the twisting motion of the springs will be neutralized because the force imparted on one side of the vehicle is counteracted by the force on the other side. In other words, if the right-hand shackle is a compression shackle and the left-hand shackle is a tension shackle, and the right-hand wheel is raised, the movement of both shackles will be in a counterclockwise direction. The shackle at the right of the vehicle will exert a force acting to the left but the shackle at the left of the vehicle, owing to the fact that it has a differently arranged fulcrum on the bracket supporting it from the frame, will cause the force to act to the left to neutralize the action of the force of the compression shackle on the other side.

The manner in which the invention and its object are accomplished is illustrated on the accompanying drawing in which:

Figure 1 is a rear view of a vehicle with the body removed.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is an enlarged view of the mounting of the tension shackle or the one shown at the left-hand side in Figure 1.

Figure 4 is a section on the line 4—4 of Figure 1 and showing the compression shackle.

Referring to the drawing, the vehicle as a whole is indicated at 2. The vehicle has the usual frame 4 comprising the side bars 6 and 8 and the transverse cross members 10 and 12. The usual wheels are indicated at 14 and these wheels supported by the dead axle 16 which houses the live axle 18. The differential housing is indicated at 20 and the differential carrier at 22.

The leaf springs of the vehicle are indicated at 24 and the front end of each spring is pivoted to a bracket 26 secured to the frame. The spring end 28 is formed into an eye which surrounds a sleeve 30 which has a bolt 32 passing through the middle thereof and rubber 34 under compression fills the space between the parts 30 and 32. The bolt 32 extends into the frame and into the bracket 26 to mount the spring end.

The springs 24 are connected to the axle housing 16 by means of the U bolt 36, the nuts 38, and the securing plate 40. A saddle 42 is secured to the dead axle 16 and serves as a seat for the springs 24. Suitable wear plates 44 are positioned on the two sides of the spring at the place where it is secured to the axle.

The usual shock absorbers 46 are secured to the frame at their upper ends and to extensions 48 on the plate 40 at their lower ends.

At the rear end of the frame one spring 24 is connected by a compression shackle 50 to the frame. The shackle is pivoted at 52 to a bracket 54 secured to the frame and at 56 to the spring end. The shackle may be of the conventional type comprising two side members connected by a central bolt or connecting member 58. The connections between the shackle 50 and the spring 24 and bracket 54 may be the same as shown at the left of Figure 3 by parts 28, 30, 32 and 34.

The shackle 60 at the other side of the vehicle is a tension shackle, and instead of being secured to a bracket closely adjacent the frame, is secured to the downwardly projecting end 62 of a bracket 64 which is secured to the frame. The shackle 60 extends upwardly from its pivotal connection 66 to the bracket and the other shackle end is pivoted at 68 to the end of the spring 24.

From the description given it will be apparent that the weight of the vehicle as it acts on the frame and downwardly through the axle will place the shackle 50 under compression and the shackle 60 under tension.

With the structure as described, it will be apparent that when the right-hand wheel in Figure 1 is raised, the springs 24 at both sides will be given a counterclockwise rotation which in turn will be communicated to the shackles 50 and 60, likewise to cause them to have a counterclockwise rotation. This counterclockwise rotation on the compression shackle 50 will cause a reaction through the bracket 54 on the frame 4 in the direction of the arrow A shown in Figure 1. The counterclockwise movement of the shackle 60 at the left side of the vehicle will cause a reaction through the bracket 64 and communicate its force to the frame in the right-hand direction as indicated by the arrow B, so that the forces from the two springs will be in opposite directions intended to neutralize each other and diminish cross shake, or the relative movement between the body and the wheels.

I claim:

1. In a spring suspension for a vehicle having a frame supported by wheels mounted on an axle, leaf springs interconnecting the axle with the vehicle frame, one spring only at each side of the vehicle, said springs being movably connected at both ends to the frame, the rearwardmost ends of said springs each having a shackle between the spring end and the frame, one of

said shackles being in tension and the other shackle in compression.

2. In a spring suspension for a vehicle having a frame supported by wheels mounted on an axle, leaf springs interconnecting the axle with the vehicle frame, one spring only at each side of the vehicle, said springs being movably connected at both ends to the frame, the rearwardmost ends of said springs each having a shackle between the spring end and the frame, one of said shackles extending in a downwardly direction and being directly pivoted at its upper end to the frame, the other shackle extending in an upward direction and being pivoted at its lower end to a bracket secured to the frame.

3. In a spring suspension for a vehicle having a frame supported by wheels mounted on an axle, leaf springs interconnecting the axle with the vehicle frame, one spring only at each side of the vehicle, said springs being movably connected at both ends to the frame, the rearwardmost ends of said springs each having a shackle between the spring end and the frame, one of said shackles extending in a downwardly direction and being pivoted at its upper end to the frame, the other shackle extending in an upward direction and being pivoted at its lower end to a bracket secured to the frame and having the pivoted part at the upward end in substantial alignment with the pivoted lower end of the other shackle.

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