

J. HOFMANN.  
PNEUMATIC SPRING FOR VEHICLES.  
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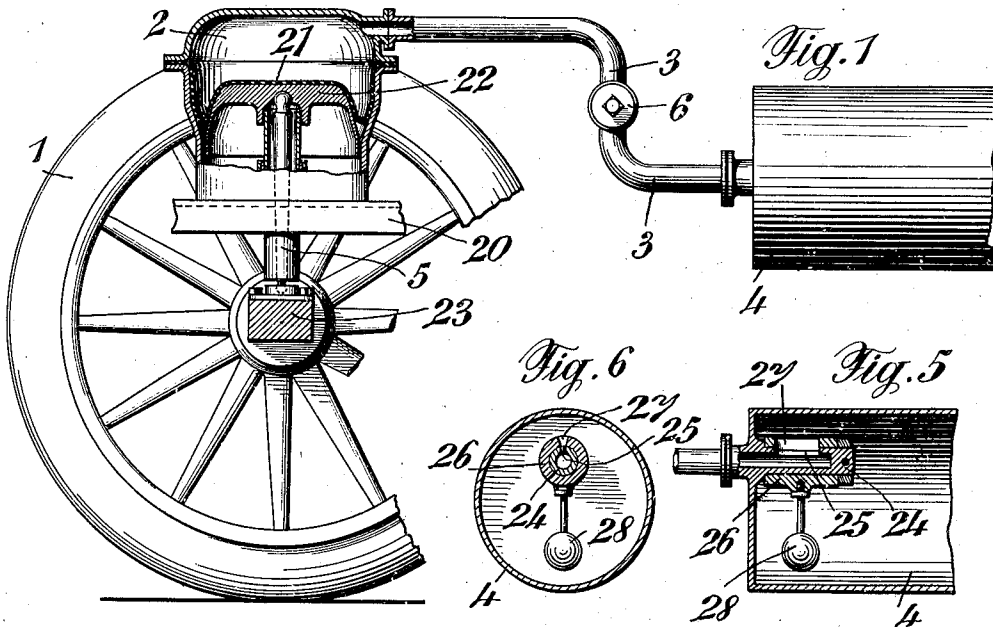
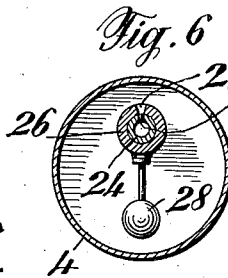
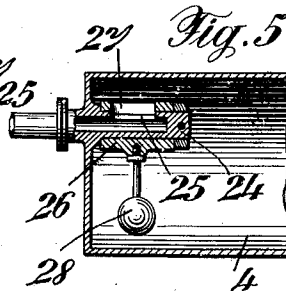
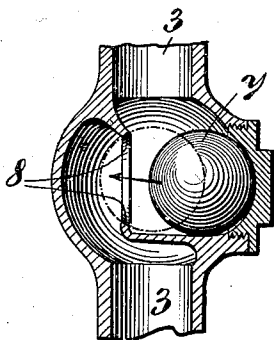


Fig. 2

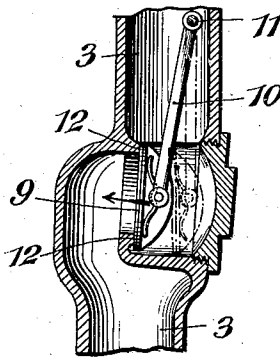


Fig. 3

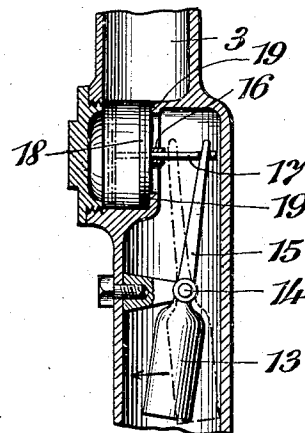


Fig. 4

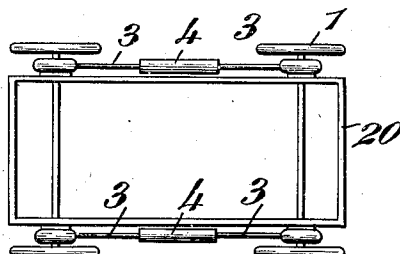


Fig. 7

Witnesses:

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# UNITED STATES PATENT OFFICE.

JOSEF HOFMANN, OF BAUMAROCHE, SWITZERLAND.

PNEUMATIC SPRING FOR VEHICLES.

1,094,567.

Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, JOSEF HOFMANN, a citizen of the Republic of Switzerland, residing at Baumaroche, Switzerland, have invented certain new and useful Improvements in Pneumatic Springs for Vehicles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to pneumatic springs for vehicles and the object of the invention is to so construct the pneumatic spring, that the frame and the carriage body are prevented from being displaced with regard to the axles and the wheels by automatically diminishing the effective volume of the pneumatic spring when the vehicle drives through a curve or on a laterally inclined road.

Several constructions according to this invention are illustrated by way of example in the accompanying drawing in which—

Figure 1 shows parts of a vehicle with a construction according to this invention. Figs. 2 to 6 show different forms of constructions of a detail. Fig. 7 shows the device mounted on a vehicle.

The casing 2 of rigid material is mounted on the frame 20 of a car by the side of the wheel 1. A pipe 3 connects the casing to an air-chamber 4. A completely air-tight chamber which is filled with air is formed within the casing by a diaphragm 21. The diaphragm rests on a plunger 22. The pressure exerted on the axle 23 of the vehicle is transmitted to the plunger by means of a rod 5. The pipe 3 is provided with a closing device 6 which is constructed so that it automatically disconnects the casing 2 from the air-chamber 4 as soon as the vehicle drives through a curve or on an inclined road, diminishing thus the effective volume of the pneumatic spring. Different forms of construction of such closing device are shown in Figs. 2 to 6.

In the construction according to Fig. 2 the pipe 3 is closed by means of a ball 7. By centrifugal action if the car drives through a curve, or by gravity if the car drives on a laterally inclined road, the ball 7 is moved in the direction of the arrow into the posi-

tion shown in dotted lines, against a correspondingly formed valve seat, whereby the pipe 3 is closed.

In the construction according to Fig. 3 the valve-body 9 is secured to the rod 10, which is pivoted to an axle 11 within the pipe 3. By a force acting in the direction of the arrow the valve-body 9 is moved from the position shown in dotted lines into the position shown in full lines against the seat 12, closing hereby the pipe 3.

In the construction according to Fig. 4 a weight 13 is mounted on a pivot 14 and forms the lower arm of a double armed lever 15, the upper arm of which engages a spindle 17, slidably mounted in a bearing 16 and carrying a valve-body 18. By a force acting in the direction of the arrow, the valve-body 18 is moved from the position shown in dotted lines against the valve-seat 19, closing hereby the pipe 3.

Fig. 5 is a longitudinal section of a fourth construction of the closing device, of which Fig. 6 is a cross-section. In this form of construction the closing device is mounted at the end of the pipe 3 within the air-chamber 4. A pipe 24 connected to the pipe 3 projects into the chamber 4 and is closed at the end. The pipe 24 is provided on the top with a port 25. On the pipe 24 is mounted a tubular rotary slide valve 26 having a port 27 corresponding with the port of the pipe 24. A weight 28 is secured to the valve 26. By a force acting on the weight in a direction to the right or left (Fig. 6), the valve is turned and the pipe 3 closed.

The device acts as follows: If the vehicle drives through a curve or on a road which is inclined in a direction at right angles with the direction of the road, the carriage body tends to become displaced with regard to the wheel axles, that is to say to become inclined toward one side. By the device according to this invention the casing 2 is disconnected from the air chamber 4 as soon as a force tending to move the carriage-body in the described manner begins to act. By this means the effective volume of the pneumatic spring is decreased. If the piston 22 now enters the cylinder 2, the inclosed air is compressed. The pressed air within the casing prevents the piston from farther entering the casing and therewith the carriage body from being displaced with regard to the wheel axles.

An automatic closing device is provided

in each of the pipes 3 (Fig. 7). By the devices according to Figs. 2 to 4 the pipes are only closed on that side toward which the carriage body tends to incline, while by the construction according to Figs. 5 and 6 the casings 2 are disconnected from the air-chambers on both sides of the vehicle. This is of advantage, because the air in the casings at one side of the vehicle is compressed, while the air in the casings of the other side of the vehicle is expanded. By this means the air cushions at both sides of the vehicle act to prevent the carriage body from being displaced.

I claim:

1. In a pneumatic spring, air cushions, air chambers, pipes connecting the cushions with said air chambers and cut off members operable by gravity and centrifugal force and capable of closing said pipes to suddenly diminish the effective volume of the

air cushions, said members being independent of the relative position of the members of the pneumatic spring.

2. In a pneumatic spring air cushions, air chambers, pipes connecting the cushions with said air chambers, valves provided on said pipes automatically closing the pipes by centrifugal action and gravity.

3. In a pneumatic spring, air cushions, air chambers, pipes connecting the cushions with said air chambers, a port divided in said pipe, a rotary slide valve having a corresponding port and a weight connected to said valve.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

JOSEF HOFMANN.

Witnesses:

HENRY HASPER,  
WOLDEMAR HAUPT.