

A. MANS.
PNEUMATIC SHOCK ABSORBER.
APPLICATION FILED JULY 24, 1909.

963,606.

Patented July 5, 1910.

Fig. 5.

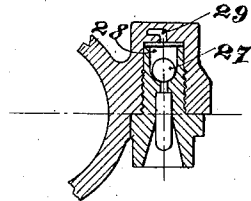


Fig. 1.

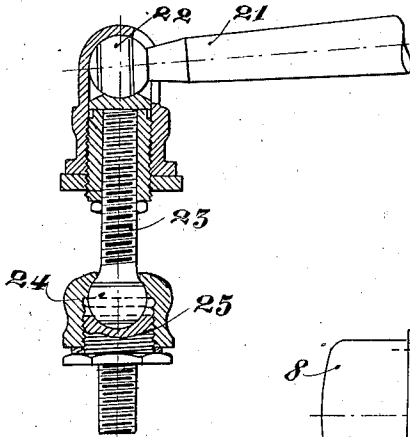
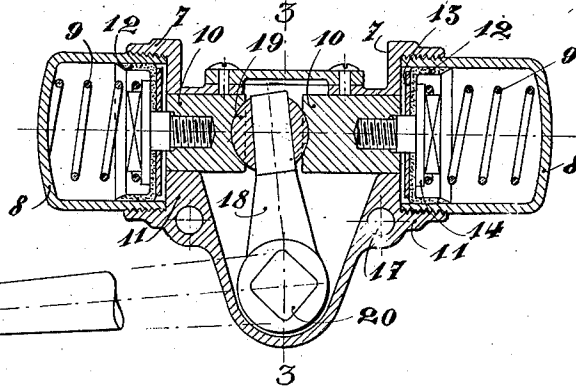


Fig. 2.

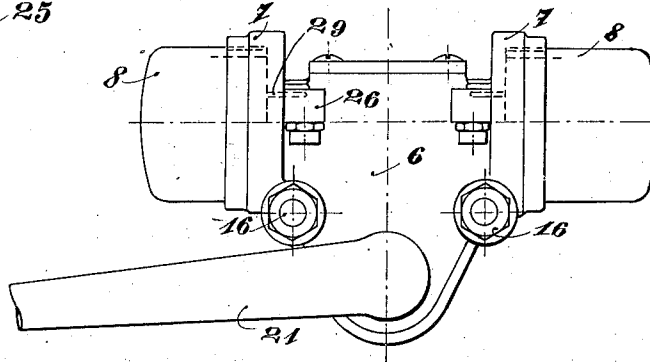


Fig. 3.

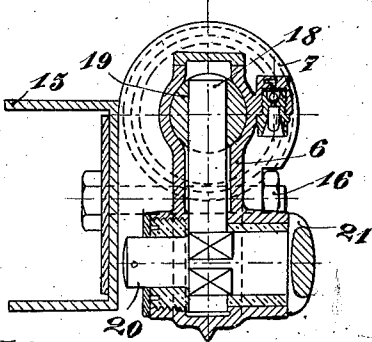
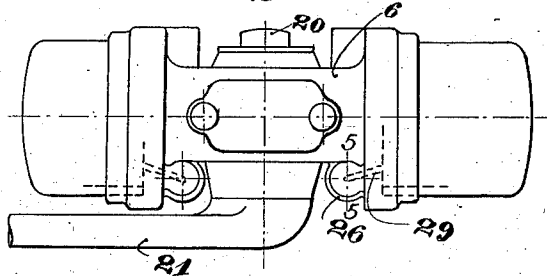


Fig. 4.



Witnesses
C. Hermann
C. Schellinger

Inventor
Albert Mans
by J. Singer
Att'y

UNITED STATES PATENT OFFICE.

ALBERT MANS, OF DIEGHEM, BELGIUM.

PNEUMATIC SHOCK-ABSORBER.

963,606.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALBERT MANS, a subject of the King of Belgium, and residing at Villa "Les Lierres," Dieghem, in the Kingdom of Belgium, have invented certain new and useful Improvements in Pneumatic Shock-Absorbers, of which the following is a specification.

The invention relates to improvements in pneumatic apparatus for the lessening of shocks produced during the progress of vehicles and caused by the unevenness of the road.

The object of the invention is to produce an apparatus of simple and efficient construction, designed to be used as a supplemental means of elastic suspension of the frame of a vehicle on its axles.

A form of execution of the pneumatic device, constituting the object of the present invention, is described in the following specification, with reference to the annexed drawing, in which:

Figure 1 is a sectional view through the longitudinal axis of the apparatus; Fig. 2 a side view of same; Fig. 3 a cross-section by the line 3—3 of Fig. 1; Fig. 4 a plan view of the apparatus; Fig. 5 a partial section by the line 5—5 of Fig. 4.

The apparatus consists of a hollow frame 6 forming an air-tight casing, on the ends 7—7 of which two opposite cylinders 8—8 are fixed, in which air-tight pistons may move and are pushed to the bottom of their stroke by springs 9—9; the rods of said pistons being conveniently guided in the end-parts 11—11 of casing 6. Each piston consists of a chased piece of leather 12 pressed against a disk 13 by a bolt 14 screwed into the piston-rod 10.

The casing 6 is fixed on the frame 15 of the vehicle by means of bolts 16 passing through holes 17. Said pistons are caused to move by means of an oscillating thumb 18, sliding in a ball-and-socket-joint 19 which acts in spherical cavities on the ends of the piston rods. Said oscillating thumb forms one solid piece with the pivoting axle 20 of a lever 21, the end of which, fitted with a ball-and-socket joint 22, is connected to the axle by means of a short adjustable connecting rod 23 coupled by means of ball-and-socket joint 24 to the part 25 conveniently fixed on said axle. The lever-arm 21 is worked by the relative movements of axle and frame.

A suction-valve box 26 is provided for each of the cylinders. This suction valve consists of a small ball located in a chamber 28 communicating with the inside of the corresponding cylinder by means of a duct 29.

The working of the apparatus is as follows: During a flexion of the suspension-spring, that is to say, when the axle draws nearer to the frame, for instance when the wheel meets with an obstacle, the thumb 18 inclines toward the right, pushing the corresponding piston into its cylinder, thus compressing the air in front of the piston and causing a vacuum behind it, while the other piston remains quiet. In consequence of the relative vacuum created behind the moving piston, a certain amount of air will enter into the cylinder through the duct 29 after having lifted the valve 27. As a result of the flexion of the suspension spring a reaction will take place *i. e.* the axle draws away from the frame and the thumb 18 which follows the movements of said axle, will move to the left. The air drawn in is compressed into the suction chamber by means of the piston's return movement, caused by the action of the antagonist spring 9 and, as the chased leather piece forms an automatic valve, this compressed air passes into the compression chamber in front of the piston. When the reaction of the suspension spring of the vehicle causes the axle to withdraw abnormally from the frame, the thumb 18 will incline toward the left, pushing the lefthand piston into its cylinder. The movement of this piston produces the same compression and suction effects, as that of the piston mentioned before, so that the movement of reaction will be broken by air-compression in the lefthand cylinder, as well as the movement of flexion was broken by air-compression in the cylinder to the right. (Fig. 1.) A succession of suctions and compressions will take place in both cylinders during the subsequent flexions and reactions of the suspension-spring, causing the pressure in the cylinders gradually to increase, until reaching a certain limit determined by the ratio between the volume of dead-space and the maximum suction-capacity.

It will be easily understood that the volume of dead-space may be regulated so that the compression in the cylinder be limited at will.

It will be obvious that as the ball valve 27 is not spring pressed and as it is constantly subjected to vibration during the running of the vehicle, it will not remain constantly seated at any time. This ball valve 27 will permit of a constant leakage of air from the suction side of the cylinder, to which it is connected, thereby always permitting a slow return of the piston to the position shown in Fig. 1. When one of the pistons has been moved outwardly the air in the outer end of the cylinder will be compressed but as the piston returns to the suction side of the cylinder the space in the outer part of the cylinder gradually increases. If the compression in the outer part of the cylinder is such that air cannot be admitted past the piston 12 then the return movement of the piston 12 will be retarded under the action of the spring 9 but will continue its return movement because of the constant leakage through the unseating and vibration of the ball valve 27. It will thus be seen that there is not a constant increasing pressure in the outer ends of the cylinder but only such pressure as may be admitted thereto and that such pressure is constantly maintained low because of the constant leakage through ball valve 27. This insures a slow return of the piston.

Having thus described my invention and the means to embody it, what I claim is:

1. In a pneumatic shock absorber for vehicles, the combination with a member adapted for attachment to the axle, a pair of pistons arranged to engage on opposite sides of a portion of said member and to act upon the same in opposite directions and to be acted upon thereby in opposite directions, airtight cylinders for said pistons adapted for connection with the vehicle, springs normally holding said pistons in one extreme position in said cylinders and in engagement with said member, and a valve for each cyl-

inder admitting air to said cylinder on that side of the piston opposite to the side engaged by the spring and serving to resist discharge of air from said cylinders but permit constant slow leakage therefrom.

2. In a pneumatic shock absorber for vehicles, the combination with a pair of airtight cylinders connected with the frame of the vehicle, a piston for each of said cylinders having packing arranged to allow air to pass from one side to the other of said pistons, springs for normally thrusting said pistons to one extreme position in said cylinders, a valve for each cylinder communicating therewith on that side of the piston thereof opposite to the side engaged by its springs and constructed to freely admit air to and resist but permit discharge and constant leakage of air from said cylinder, and an oscillating member adapted for connection with the axle of the vehicle and interposed between and loosely engaging said pistons.

3. In a pneumatic shock absorber for vehicles, the combination of a pair of airtight cylinders connected with the frame of the vehicle, a piston for each cylinder dividing the same into a suction and compression side, a spring in the compression side of each cylinder normally thrusting the piston thereof toward the suction side, a suction valve communicating with the suction side of each cylinder and permitting constant leakage of air therefrom, and an oscillating member adapted for attachment to the axle of the vehicle and interposed between and loosely engaging said pistons.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT MANS.

Witnesses:

J. FARETTE,
JAMEA G. FAY.