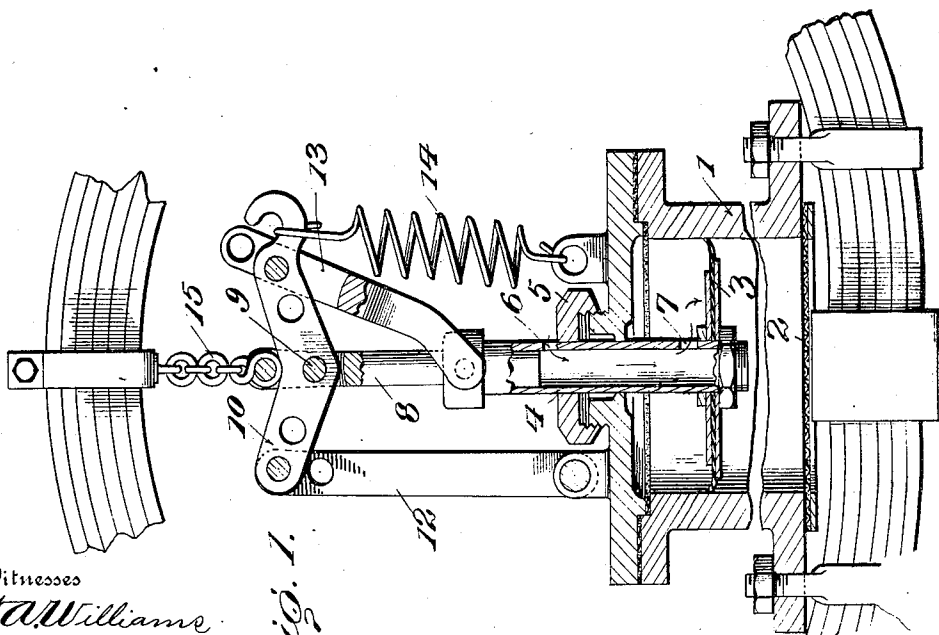
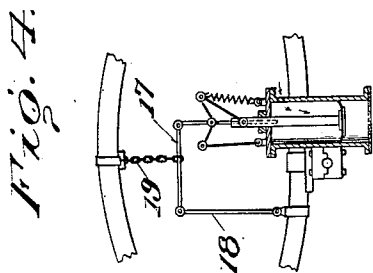
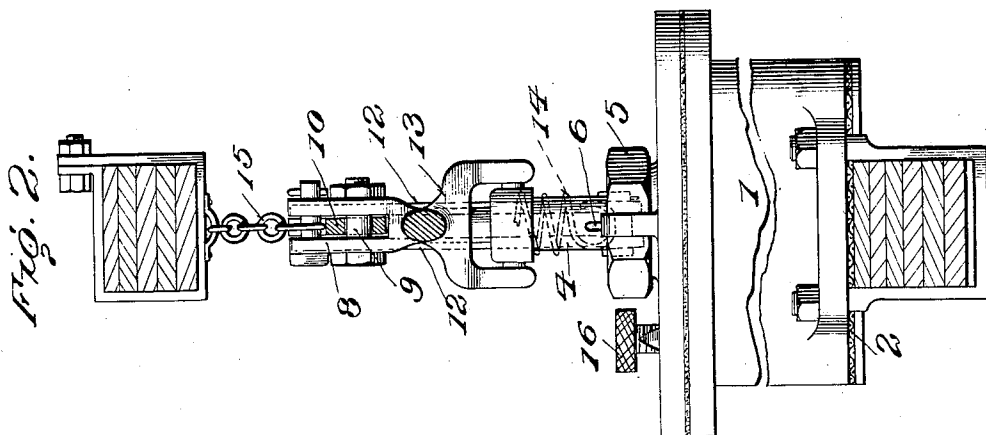


J. H. GIBSON.
SHOCK ABSORBER.
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JOHN H. GIBSON, OF GREENVILLE, PENNSYLVANIA.

SHOCK-ABSORBER.

951,070.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN H. GIBSON, of Greenville, in the county of Mercer and State of Pennsylvania, have invented certain new and useful Improvements in Shock-Absorbers; 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.

The primary object of this invention is to provide simple and highly efficient means for regulating or controlling the recoil of the springs of any vehicle. It is well known that injury to such springs is occasioned by the jar or strain thereon following their recoil. By means of my invention it is sought to allow such recoil to occur as quickly as necessary and yet control it to an extent sufficient to prevent injury to the springs.

A further object is to provide a device of this character which will not interfere with the free movements of the springs when the vehicle is subjected to only slight jars.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a view partly in side elevation and partly in section, showing my present improvement. Fig. 2 is a view at right angles to Fig. 1, some of the parts being in section. Fig. 3 is a detail. Fig. 4 shows a slight modification.

Referring to the drawings, 1 designates a cylinder which is open at its bottom to the outside atmosphere, and over this bottom is a screen 2 to prevent the admission of foreign substances. Within this cylinder is a vertically-movable piston 3, having a flexible disk which permits air to enter from beneath the piston only as the latter descends. The piston rod 4 is hollow and extended outwardly through a stuffing box 5 in the cylinder-head. This piston rod is formed with an outer port 6 and an inner port 7 for establishing communication between the cushioning side of the piston and the outer atmosphere when the piston is in its normal position or the vehicle is subjected to only slight jars. Within this piston rod, and projecting beyond the outer end thereof, is fitted a plunger 8, which at its upper end is connected by a pin 9 to arm 10 pivoted at one end to the upper end of

an upright arm 12 which in turn is pivoted at its lower end on the cylinder head.

To the free end of arm 10 is pivotally connected a link 13, the lower end of which is forked so as to span and connect with the upper end of piston rod 4, and this end of arm 10 is also connected by a spring 14 to the cylinder-head. For the purpose of increasing or decreasing the speed of travel of the piston, as well as the extent of such travel, the arm 10 is adjustably connected to arm 12, and for the same purpose link 13 is adjustably connected to arm 10. The angular positions of the arms 10 and 12 relatively to the axis of the plunger is thus made adjustable so that the rate of the speed of the piston to that of the plunger may be made a maximum or a minimum at any predetermined part of the upward or recoil stroke. The plunger 8, at a point above lever arm 10, is shown as connected by a chain 15 to the upper half of a pair of elliptical springs, but when only a half spring is employed this connection may be made direct to the body of the vehicle.

In practice, when the vehicle is subjected to slight jars on smooth roads, the piston is capable of moving freely, without offering any appreciable resistance, because the spaces on both sides of the piston are open to the atmosphere, but when the vehicle is subjected to more severe jars, the upper port 6 is closed on the downward stroke of the plunger and piston rod, and the flexible disk of the piston permits the entrance of air above the piston, said downward movement being effected by spring 14 when the spring of the vehicle is compressed. By reason of the connection between arm 10 and the piston rod, through link 13, the piston is given an accelerated motion relatively to the plunger. Although the piston will not in any way interfere with the compression of the vehicle springs, yet on the recoil of the latter, the piston acting against the cushion formed by the air entrapped in the top of the cylinder will control such recoil. The speed at which the springs are allowed to recoil is regulated by the upward travel of the piston, and this is controlled by the escape of the air from the cushioning side of the piston. For this purpose, I employ a valve 16 which is shown in the form of a flattened and tapered screw working in an opening in the cylinder-head, said valve having a milled

head to permit of its being easily turned. By adjusting this valve the outlet of the air may be regulated to adapt the attachment to various conditions. In the upward movement of the piston, the air will escape through valve 16, and there can be no other outlet of the entrapped air until the outer port 6 of the piston rod is clear of the stuffing box. If the recoil be very quick or pronounced the too sudden escape of the air through port 6 is prevented by plunger 8 which closes such port by reason of the relative movement between the plunger and the piston rod, the latter being elevated at a more rapid speed than the plunger. The ratio of the speed of the piston to that of the plunger may be controlled in a measure by the angular position of the arm 10 to arm 12, and this position is therefore adjustable so that the speed of the piston can be made very rapid at the beginning of the recoil and slower as the spring recoils above its neutral position, but with increased pressure due to the piston being nearer the top of the cylinder. This arrangement causes the piston to attain a higher position in the cylinder, and consequently a greater compression soon after the recoil commences.

In Figs. 1 and 2 I have shown the piston cylinder as being attached directly to the lower half of a pair of elliptical springs and directly above the axle, although a flexible connection, permitting of relative horizontal motion between the two halves of the springs, may be used. In Fig. 4 I have shown it secured to the side of the axle, and since the piston rod is not in direct line with the centers of the two springs, it is necessary to employ a lever 17 which is supported by a link 18 mounted directly on the lower spring, the lever 17 being connected by a chain 19 to the upper spring, or it may be to the vehicle body.

The advantages of my invention will be apparent to those skilled in the art. It will be observed that the same is extremely simple and inexpensive and not liable to readily get out of order, and that while it does not interfere with the compression of the springs, it readily controls the recoil thereof and prevents injury by any undue jar or strain. At the same time, it offers practically no resistance to the free movements of the springs consequent upon slight jars as on smooth roads.

I claim as my invention:

1. A shock absorber for vehicles comprising a cylinder constantly open to the atmosphere at one end and having a head at the other end, a piston in said cylinder, air being allowed to pass from the said open end of the cylinder to the space between the piston and the cylinder head when the piston is moved in one direction, means forming communication between the atmosphere and the space

Between said piston and said head when the piston is in its normal position, means for automatically closing such communication at a predetermined point in the travel of the piston, and means for regulating the outlet of the air from the cylinder on the return stroke of the piston.

2. A shock absorber for vehicles comprising a cylinder, a piston in said cylinder, means forming communication between the atmosphere and the space between said piston and one end of the cylinder when the piston is in its normal position, and means for cutting off the escape of air through such communication at a predetermined point in the travel of the piston in one direction and also at a predetermined point in the travel of the piston in the opposite direction.

3. A shock absorber for vehicles comprising a cylinder open at one end and having a head closing its other end, a piston in said cylinder having its rod extended through said head, said piston being so constructed as to permit air to pass around its edge when moved in one direction, such air entering the space between the piston and said head, means forming communication between the atmosphere and the space between said head and said piston when the latter is in its normal position, means for closing such communication at a predetermined point in the travel of the piston toward the open end of the cylinder, and means for regulating the outlet of air from the space between said piston and said head when the piston is moved in the opposite direction.

4. A shock-absorber comprising a cylinder, a piston therein having a hollow rod, said rod having inner and outer ports which form communication between the outside atmosphere and the cylinder at one side of said piston, means for closing such communication when the piston is moved in one direction, means for so moving the piston, and means for allowing the air to escape from the cylinder on the return stroke of the piston.

5. In combination with a vehicle and a sustaining spring therefor, of a shock-absorber comprising a cylinder, a piston therein, means connecting the piston to the vehicle, means for moving the piston in one direction, when the vehicle spring is compressed, such piston being moved in the opposite direction under the recoil of the vehicle spring, means normally forming communication between the atmosphere and the cylinder at one side of said piston, such communication being automatically cut off at a predetermined point in the travel of the piston, when the vehicle spring is compressed, air being admitted to said side of the piston when the latter is so moved by the compression of the vehicle spring, and means for allowing the air to escape from the cylinder

der when the piston is moved by the recoil of the vehicle spring.

6. The combination with a cylinder closed at one end and open at the other end, of a piston in said cylinder having a hollow rod extended through the closed end of the cylinder and provided with inner and outer ports, a plunger fitted in said rod, a pivoted arm to which said plunger is connected, means connecting said arm to said piston rod for imparting an accelerated motion thereto relative to said plunger at the beginning of the recoil, and a spring acting on said arm to move said piston in one direction.

7. The combination with a cylinder closed at one end and open at the other end, of a piston in said cylinder having a hollow rod extended through the closed end of the cylinder and provided with inner and outer ports, a plunger fitted in said rod, a pivoted arm to which said plunger is connected, a link connecting said arm to said piston rod, and a spring acting on said arm to move said piston in one direction.

8. The combination with a cylinder closed at one end and open at the other end, of a piston in said cylinder having a hollow rod extended through the closed end of the

cylinder and provided with inner and outer ports, a plunger fitted in said rod, an upright arm mounted on said cylinder, a second arm pivoted to the upright arm, a link adjustably connected to said second arm and also to said plunger, and a spring acting on said second arm to move said piston in one direction.

9. The combination with a pair of vehicle springs of a cylinder fixedly mounted relatively to one spring, said cylinder being closed at one end, a piston in said cylinder having a hollow rod and ports forming communication between the outside atmosphere and the cylinder at one side of said piston, a plunger in said rod, means connecting said plunger to the other of said springs, an upright arm mounted on said cylinder, a second arm pivoted to the upright arm and to which said plunger is connected, a link connecting such second arm to said piston rod, and a spring acting on said arm.

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

JOHN H. GIBSON.

Witnesses:

H. L. KECK,
WALTER SAMANS.