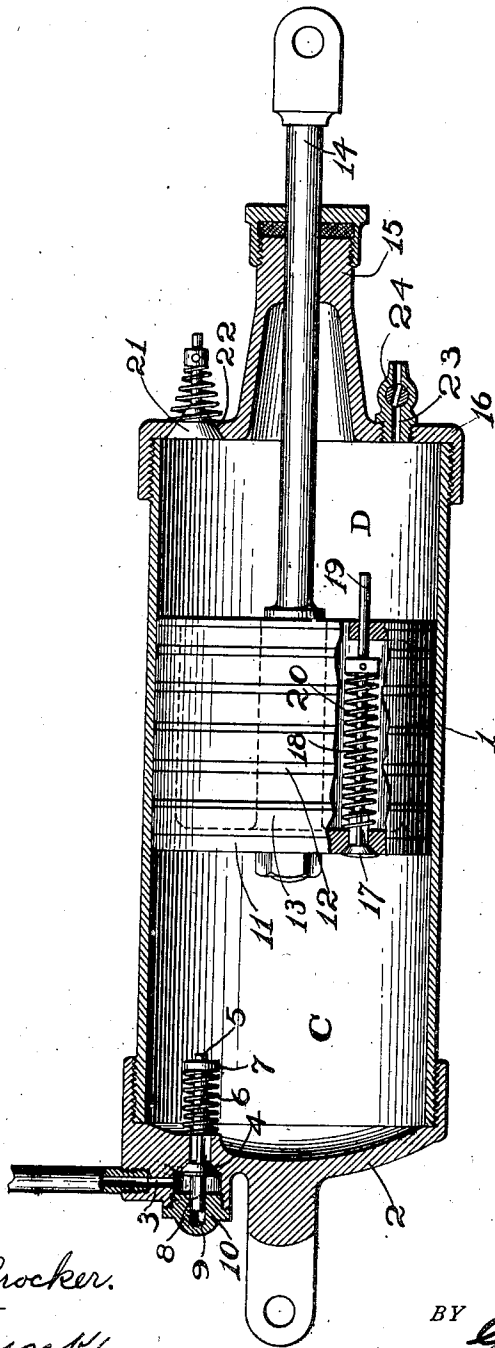


A. F. ROCKWELL & C. F. SCHMELZ.
CUSHIONING DEVICE.

APPLICATION FILED FEB. 23, 1906.

1,036,340.

Patented Aug. 20, 1912.



WITNESSES:

Chas. J. Crocker.

B. F. Funk

INVENTORS

A. F. Rockwell

C. F. Schmelz,

BY

Giles D. Moore
ATTORNEY.

UNITED STATES PATENT OFFICE.

ALBERT F. ROCKWELL AND CHARLES F. SCHMELZ, OF BRISTOL, CONNECTICUT, ASSIGNORS TO THE NEW DEPARTURE MANUFACTURING COMPANY, OF BRISTOL, CONNECTICUT, A CORPORATION OF CONNECTICUT.

CUSHIONING DEVICE.

1,036,340.

Specification of Letters Patent.

Patented Aug. 20, 1912.

Application filed February 23, 1906. Serial No. 302,652.

To all whom it may concern:

Be it known that we, ALBERT F. ROCKWELL and CHARLES F. SCHMELZ, citizens of the United States, residing at Bristol, county of Hartford, State of Connecticut, have invented certain new and useful Cushioning Devices, of which the following is a full, clear, and exact description, 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, forming part of this specification.

This invention relates to a cushioning device which may be utilized in numerous ways, but it is particularly designed for use in connection with motor vehicles, wherein the body of the vehicle is cushioned upon a base or running-gear.

In patent granted to Albert F. Rockwell, on or about December 7, 1909, No. 942219, means is shown for cushioning the body with respect to its base or support, and the present invention might be substituted for the cushioning device coöperating with the rockable elements illustrated in the said patent. However we do not limit ourselves to the association of the present invention with the specific mechanism shown in the said patent, because various means may be utilized for connecting the invention forming the subject matter of this application with the part to be cushioned without affecting the operation of the device herein shown.

One of the objects of the invention is to provide a cushioning device wherein its co-acting parts will have movement one with respect to the other to efficiently cushion a supported body and to absorb shocks when the pressure is relieved between the co-acting elements.

A further object of the invention is to provide means for regulating the speed of the recovery of one of the elements with respect to the other.

Other objects and advantages as well as the novel details of construction of this invention will be specifically set forth hereinafter, it being understood that changes in form, proportion and minor details of construction may be resorted to without departing from the spirit or scope of this invention or sacrificing any of the advantages thereof.

The figure in the drawing illustrates a longitudinal, sectional view through a device constructed in accordance with our invention.

The invention is herein illustrated as comprising two co-acting parts, one being shown as movable within the other, and either or both of which may be provided with means for governing the cushioning effect or the amount of pressure exerted between said two parts to compensate for the load carried by the part to be cushioned as well as to provide means for absorbing shocks when the cushioning elements are recovering.

A simple form of accomplishing the desired result is illustrated in the drawings as comprising a cylinder 1, in one cylinder-head 2 of which is a port 3, through which a suitable fluid may be introduced from the source of supply, not shown. The port 3 is normally closed by a valve, as for example, a check valve 4, which is herein illustrated as including a stem 5, projecting into the cylinder 1 in a longitudinal direction, said valve being normally seated by a spring 6, one end of which bears against the cylinder-head 2 and the other end against a collar 7 on the end of the stem. A guide stem 8 is provided on the valve 4, distant from the stem 5, said guide stem 8 being slidable in a recess 9 in a cap piece 10, closing the recess in the port 3 in which the valve operates. The stems 5 and 8 are in alinement, so as to cause a proper unseating of the valve when it is necessary to admit pressure into the cylinder, and the valve 4 may be normally retained upon its seat by the spring 6. The spring 6 may be located as shown or it may be interposed between the cap piece 10 and the valve, in which latter event the collar 7 may be eliminated. In the present instance the cylinder-head 2 serves for one of the oppositely movable co-acting elements, while the other co-acting element is herein shown as a piston 11 longitudinally movable within the cylinder and preferably provided with alternate layers of metallic and leather packing designated by the numerals 12 and 13, to prevent leakage. The piston is provided with a stem 14 which projects through the bushing 15 carried by the cylinder-head 16 of the cylinder 1. Carried by the piston 11 is a spring seated valve

17 having a stem 18 which projects beyond one face of the piston, the projecting portion 19 being adapted to abut against the face of the cylinder-head 16, so as to unseat the valve which is normally held closed by the spring 20. In the head 16 of the cylinder 1 is an inwardly opening check valve 21, which is adapted to open the port 22 when the piston is moved away from the head 16, but adapted to be seated when the piston is moved toward the head. A port 23 is also provided in the head 16, and said port may be provided with a valve 24 to regulate the size of the opening through the port 23, so as to govern the amount of the exhaust passing therethrough during a given time.

Assuming that all of the parts are properly assembled, and that the two movable parts, in the present instance the piston and its cylinder, are properly connected to the parts to be cushioned, the operation will be as follows: When a sufficient load is placed on the cushioning device, the piston 11 will have a tendency to travel toward the inlet end of the cylinder, or, indeed, both the cylinder and the piston may move one upon the other at the same time (provided, of course, that the cylinder is properly hung for this purpose). It is to be assumed that in the practical embodiment of the invention a certain quantity of fluid is in the cushioning chamber C of the cylinder. Under normal conditions the quantity of fluid will be sufficient to cushion the load, it being desirable to maintain approximately the same relative position of the piston and cylinder as shown in the drawing. In the event, however, that an abnormal pressure is applied to the piston or cylinder, or both of them, as the case may be, the parts may be so actuated that the piston will assume a position near the head 2 of the cylinder 1. As the piston assumes its position near the head 2 of the cylinder 1, it will contact with the stem 5 of the valve 4, so as to unseat the valve and admit a sufficient quantity of cushioning fluid to move the piston away from the head 2, or back to its previous intermediate position, or at least to a position a sufficient distance from the head 2 to give the desired cushioning effect. If a sufficient quantity of fluid is admitted into the cylinder, it is obvious that the load will be raised to its original position, as in the case of a vehicle body. During the time that the piston 11 is moved toward the head 2, the valve 21 will be unseated, so as to permit an inrush of air into the chamber D. Now as soon as air is admitted into the chamber C to drive the piston back toward the head 16, the air which has rushed into the chamber D, through the port 22 will be caused to become compressed, but as there is an opening in the port 23, this air will slowly exhaust from the chamber D, due to the compression

by the piston, and the cushion that has been previously provided by the compressed air in the chamber D will be slowly destroyed. Thus the tendency of the piston to have a recovery stroke imparted thereto will be resisted by this cushion in the chamber D, so that the shock of the piston on its recovery stroke will be destroyed.

The desirability of maintaining a vehicle body at a predetermined height above the base or running-gear is obvious, and it is the purpose of our invention to maintain approximately the same distance between the vehicle body and its base or running-gear at all times irrespective of the load carried, and it is for this reason that we desire to introduce a greater or lesser quantity of fluid into the cylinder to compensate for the difference in load under varying conditions. Owing to the expansibility of any cushioning fluid which might be introduced into the cylinder, the piston would remain in the proper relative position with respect to the cylinder, only so long as the load and the raising force of the cushioning fluid are approximately equal. If, for example, the load should become lightened or if an excess of fluid should be present in the cushioning portion C of the cylinder, there would be a tendency to force the piston toward the head 16, so as to change the relative position of the load and its base, but we aim to overcome such an undesirable condition by providing the safety-valve 17 in the piston. It is obvious that if the piston moves toward the head 16 until the projecting portion 19 abuts against the head 16, the valve 17 will be unseated, so that part of the pressure from portion C of the cylinder 1 will be permitted to pass through the piston into the portion D of the cylinder with the result that as the pressure in the portion C of the cylinder is relieved, the piston will move back toward the head 2, to approximately its original position.

In actual practice we purpose to so connect the parts on the side D, of the cylinder, that the fluid which may escape from the side C, of the cylinder, may exhaust to atmosphere, so that there will be no pressure in the portion of the cylinder marked D.

It will be apparent that by a construction similar to the one heretofore described, we have provided means for automatically introducing fluid into the cylinder to compensate for variations in the load with resultant variations in the pressure offered to the piston and cylinder by the load, and by so arranging the parts, all liability to sudden strains or jars due to the vibratory action of the body, or to the variation in the load will be avoided. Attention is directed to the fact that the actions of the valves are entirely automatic, and that the valves are preferably contained within the

cylinder, thereby protecting them against deterioration and enabling them to be responsive to the action of the cooperating mechanism at the proper time.

5 We reserve the right to mount or hang the devices so that one is movable while the other is stationary, the movable part being either the piston or the cylinder, or we may arrange the parts so that both the cylinder
10 and the piston move. In any of these events, the generic principle is the same and each form would involve the arrangement of two parts, one of which is movable with relation to the other, and one of the parts
15 having automatic means for governing the fluid pressure in proportion to the load to be cushioned.

What we claim is:

1. In a device of the class described, a
20 cushioning cylinder having a valved inlet port, a piston working in the cylinder and adapted to actuate the valve to open the inlet port, an inlet valve at the end of the cylinder opposite to the supply port, said last
25 mentioned valve being adapted to admit air into the cylinder under natural pressure, and an exhaust port for permitting the air to exhaust from said cylinder.

2. A cushioning cylinder, means for introducing fluid into the cylinder, a piston
30 working in said cylinder and having a valve for letting off some of the fluid within the cylinder, an inwardly opening valve at the exhaust end of the cylinder, and an exhaust
35 port in said exhaust end of the cylinder.

3. A cushioning cylinder having an inlet port, a valve in the inlet port and provided with a stem projecting within the cylinder, a piston working in said cylinder and adapted
40 to contact with the stem to admit sufficient fluid within the cylinder to provide the requisite cushion, and means for providing a shock absorbing cushion in the cylinder at the end of the piston opposite to
45 the inlet port.

4. The combination of a cylinder having a valved inlet opening at one end and an exhaust opening at the opposite end, the stem of the valve in the inlet opening projecting within the cylinder, a freely movable piston in the cylinder and normally
50 out of contact with the said valve stem, and a valve in the said piston, said piston being capable of movement in one direction for
55 contact with the first named valve stem to unseat said valve, so as to admit pressure, said piston being also capable of movement

in an opposite direction to unseat the valve carried thereby, so that the pressure may exhaust through the piston and then
60 through the exhaust opening in the cylinder.

5. In a device of the class described, a cushioning cylinder having a valved inlet port, a freely movable piston in said cylinder and provided with an exhaust valve
65 which when unseated will permit pressure to exhaust through the piston, the movement of said piston being effective in controlling the pressure within the cylinder.

6. A cushioning device comprising a cylinder having a valved supply port, a piston
70 in said cylinder, and a valved exhaust port in the piston, said piston being capable of movement in one direction to open the supply port and movable in an opposite direction
75 to permit the supply port to close, and open the exhaust port.

7. A cushioning device comprising a cylinder having a valved inlet port, a piston
80 in said cylinder having an independent valve for normally closing an exhaust port in said piston, a stem on the valve in the piston adapted to engage a part of the cylinder to unseat said valve when the piston is
85 near the limit of its stroke in one direction, said piston being effective to unseat the valve in the supply port when the piston is near the limit of its stroke in the opposite direction.

8. In a cushioning device, the combination with a cylinder, of a freely movable
90 piston in said cylinder and inclosed thereby, a valved inlet port at one end of the cylinder to admit pressure between one end of the cylinder and piston, an inwardly opening
95 valve at the other end of the cylinder to admit a fluid between one end of the cylinder and the piston, an exhaust port at one end of the cylinder, and a valve in the piston normally closed but adapted to be opened
100 during the movement of the piston in one direction so that communication may be established between the spaces in the cylinder formed by the piston which is interposed between said cylinder ends.
105

In testimony whereof we hereunto affix our signatures, in the presence of two witnesses.

ALBERT F. ROCKWELL.
CHARLES F. SCHMELZ.

Witnesses:

B. F. FUNK,
JOSEPH D. BROWN.