A valve for limiting the pressure in a crankcase of a motor vehicle, comprising a first line and a second line, which can be fluidically connected by a movable body, the body being connected to a rolling diaphragm and, together with the rolling diaphragm, being able to expose or close a flow duct, is characterized in that, with respect to the object of designing and refining a valve of the type mentioned above such that it has a compact construction and allows pressure to be reduced in the crankcase of a motor vehicle with low noise, the rolling diaphragm rolls on a separating element, which is positioned in the flow duct between the first line and second line at least in some regions.
VALVE FOR LIMITING THE PRESSURE IN A CRANKCASE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to German Patent Application No. 10 2011 018 980.7 filed on Apr. 28, 2011, the disclosure of which is incorporated by reference herein in its entirety.

FIELD OF INVENTION

[0002] The invention relates to a valve for limiting the pressure in a crankcase of a motor vehicle, comprising a first line and a second line, which can be fluidically connected by a movable body, wherein the body is connected to a rolling diaphragm and, together with the rolling diaphragm, can expose or close a flow duct.

BACKGROUND

[0003] Valves of the type mentioned above are already known from the state of the art. A valve which is used to vent the crankcase is known from DE 20 2005 012 403 U1. This valve comprises a rolling diaphragm, which exposes some sections of concentrically arranged flow ducts. A flow duct is exposed whenever a pressure differential develops which is sufficient to lift the rolling diaphragm.

[0004] Moreover, valves in which a movable body lifts off a sealing seat so as to expose a flow duct are known from the prior art. The movable body is lifted whenever a pressure differential develops that is below a spring force. These valves are generally open in the depressurized state.

[0005] The drawback of valves known from the prior art is that they tend to make rattling noise. This noise occurs when the movable body briefly lifts off the sealing seat and then rests thereon again. This effect corresponds to chattering of the movable body, which due to the fluctuating pressure differentials continually strikes against, and then lifts off, the sealing seat.

SUMMARY

[0006] It is therefore the object of the invention to design and refine a valve of the type mentioned above such that it has a compact construction and allows pressure to be reduced in the crankcase of a motor vehicle with low noise.

[0007] The present invention relates to a valve for limiting the pressure in a crankcase of a motor vehicle, comprising a first line and a second line, which can be fluidically connected by a movable body, the body being connected to a rolling diaphragm and, together with the rolling diaphragm, being able to expose or close a flow duct, wherein the rolling diaphragm rolls on a separating element, which is positioned in the flow duct between the first line and second line at least in some regions.

[0008] A valve of the type mentioned above is thus characterized in that the rolling diaphragm rolls on a separating element, which is positioned in the flow duct between the first line and second line at least in some regions.

[0009] It was recognized according to the invention that a rolling diaphragm, which rolls on a separating element, can expose a flow duct in a particularly low-noise manner. It was further recognized that a rolling diaphragm can be produced from an elastomer, whereby the rolling diaphragm can conform to, and detach from, the separating element in a noiseless manner. Rattling noise is thus effectively prevented. It has moreover been recognized that the combination of a separating element with a rolling diaphragm surprisingly assures a compact construction of the valve, because the rolling diaphragm and the movable body can be configured as one piece. Consequently, the object mentioned above has been achieved.

[0010] The separating element could comprise passages. This specific embodiment assures that a fluid can flow from the first line to the second line, more specifically when the rolling diaphragm exposes the passages at least in some regions. The fluid can thus pass through the passages and effect depressurization in the crankcase. To this end, passages that are circular, spiral-shaped or configured in a different manner are conceivable.

[0011] The separating element could be provided the elongated slots, at least some of which extend parallel to the direction of movement of the movable body. This assures that the flow cross-sectional surface area of the flow duct can be continuously and steadily enlarged when the rolling diaphragm rolls on the separating element, following the movable body.

[0012] Against this background, it is conceivable to configure the elongated slots with inner widths that are tapered in one direction. It is thus assured that the flow cross-sectional surface area of the flow duct disproportionately increases or decreases during rolling of the rolling diaphragm.

[0013] A woven fabric could be incorporated in the rolling diaphragm. Against this background, it is conceivable for the woven fabric to be a metal mesh or metal woven fabric. This specific embodiment reinforces the rolling diaphragm, allowing it to withstand even high pressure differentials. It is also conceivable for the woven fabric to be a plastic woven fabric or plastic knitted fabric, preferably made of nylon. Plastic material advantageously lowers the weight of the rolling diaphragm, while increasing the flexibility and deformability thereof.

[0014] The movable body could be held in a position that exposes the flow duct at least partially by a spring. This specific embodiment creates a valve in which the fluid connection between the first line and second line is interrupted when a pressure differential between atmospheric pressure and pressure in the first line exceeds the spring force. To this end, the first line could be connected to the crankcase of a motor vehicle, in which an undesirably high sub-atmospheric pressure develops.

[0015] The rolling diaphragm and the movable body could be configured as one piece, wherein the rolling diaphragm has a preferably stiffened region for supporting the spring. This allows a construction of the valve that has a particularly small number of parts.

[0016] The rolling diaphragm could exhibit residual stress, which forces the rolling diaphragm back into a basic position or basic shape after a deflection or deformation out of this basic position or basic shape. A spring can thus be eliminated, because the valve is held open by the residual stress of the rolling diaphragm. The movable body is held remote from the flow duct by the rolling diaphragm, when the diaphragm is in the basic position or basic shape, such that the flow duct is open. As soon as the rolling diaphragm is deformed out of the basic position or basic shape as a result of developing pressure differentials, the movable body moves such that the flow duct is closed. As soon as the pressure differentials are reduced, or a drop below certain values has occurred, the
movable body is forced back into a position that exposes the flow duct as a result of the residual stress of the rolling diaphragm. The rolling diaphragm then return to the basic shape or basic position thereof, which it has in the non-deformed state.

Various possibilities exist for advantageously designing and refining the teaching of the present invention. For this purpose, reference is made both to the claims below, and to the description provided hereafter of a preferred exemplary embodiment of the invention based on the drawing.

Generally preferred embodiments of the teaching are also described in conjunction with the explanation of the preferred embodiment of the invention based on the drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 shows a valve for limiting the pressure in the crankcase of a motor vehicle, comprising a rolling diaphragm, which rolls on a separating element.

DETAILED DESCRIPTION

The only FIGURE shows a valve for limiting the pressure in a crankcase of a motor vehicle, comprising a first line 5 and a second line 6, which can be fluidically connected by a movable body 4, wherein the body 4 is connected to a rolling diaphragm 3 and, together with the rolling diaphragm 3, can expose or close a flow duct 9.

To this end, the first line 5 is associated with a crankcase, which is not shown here and in which undesirably high negative pressure p2 can develop. Such negative pressure p2 can develop when air is taken in via the second line 6. The second line 6 is connected to an intake tract of a motor vehicle, the intake tract not being shown and subject to a pressure p1. The force of the pressure p1 acts perpendicularly to the rolling diaphragm 3, whereby this rolling diaphragm can peel off the separating element 1 with minimal material stress.

The rolling diaphragm 3 rolls on a separating element 1, which is positioned in the flow duct 9 between the first line 5 and second line 6 at least in some regions. The flow duct 9 is thus exposed or closed.

The separating element 1 comprises passages 2. The passages 2 in the separating element 1 are designed as elongated slots 2, at least some of which extend parallel to the direction of movement of the body 4. By the rolling diaphragm 3 rolling on the separating element 1, the flow cross-sectional surface area of the flow duct 9 is enlarged or reduced.

A woven fabric is incorporated in the rolling diaphragm 3.

The first body 4 is held in a position that exposes the flow duct 9 at least partially by a spring 7. When the sum of forces of the atmospheric pressure p3 and crankcase pressure p2 on the surface area A is greater than the spring force of the spring 7, the movable body 4 is moved downward in the FIGURE. The rolling diaphragm 3 thus rolls on the separating element 1 and gradually and continuously closes the elongated slots 2. This rolling process prevents excessive suction from developing through the second line 6, which further favors the development of negative pressure p2 in the crankcase. Fluid can no longer be suctioned out of the crankcase through the first line 5 to the second line 6.

With respect to further advantageous embodiments and refinements of the teaching according to the invention, reference is made to the general part of the description and to the claims.

Finally, it shall be particularly emphasized that the exemplary embodiment selected above only serves the description of the inventive teaching, however it does not limit it to this exemplary embodiment.

What is claimed is:

1. A valve for limiting the pressure in a crankcase of a motor vehicle, comprising a first line and a second line, which can be fluidically connected by a movable body, the body being connected to a rolling diaphragm and, together with the rolling diaphragm, being able to expose or close a flow duct, characterized in that the rolling diaphragm rolls on a separating element, which is positioned in the flow duct between the first line and second line at least in some regions.

2. The valve according to claim 1, wherein the separating element comprises passages.

3. The valve according to claim 1, wherein the separating element is provided with elongated slots, at least some of which extend parallel to the direction of movement of the body.

4. A valve according to claim 1, wherein a woven fabric is incorporated in the rolling diaphragm.

5. A valve according to claim 1, wherein the first body is held in a position that exposes the flow duct at least partially by a spring.

6. A valve according to claim 1, wherein the rolling diaphragm exhibits residual stress, which forces the rolling diaphragm back into a basic position or basic shape after a deflection or deformation out of this basic position or basic shape.