

Multipurpose two-way safety valve

The present invention concerns a multipurpose two-way safety valve more particularly, although not exclusively, adapted to be mounted on a package, for example a flexible package.

Some foods, for example coffee, are known to exude gases which, when the foods are packaged, could inflate and tear the sachets containing them if valves were not provided on the latter to allow these gases to escape to the exterior if the pressure inside the sachets rises above a particular threshold, for example as described in American patent US-A-2 638 263 and French patent FR-A-2 441 114.

The above French patent describes a safety valve adapted to be disposed on an impervious sheet separating two separate spaces and including:

- a relatively rigid base adapted to be fixed to said impervious sheet by one attachment surface and having a wall at least substantially parallel to said attachment surface and carrying a first annular sleeve; and
- a relatively flexible and elastic sealing member adapted to be attached to said base and having a second annular sleeve closed by a bottom and adapted to cooperate with said first annular sleeve to provide either a seal between or communication between said separate spaces, said second annular sleeve being pressed in sealed manner onto said first annular sleeve or separated from the latter according to elastic deformations to which said bottom closing said second annular sleeve is subjected.

When mounted on a sachet, a bidirectional valve of the above kind can be used to establish a vacuum inside the sachet and to evacuate gases generated in said sachet by the foods that it contains.

However, there is an increasing requirement to be able to inject a gas into a sachet, for example to control

the conservation conditions of the foods that it contains.

The object of the present invention is to improve the above safety valve so that it can also be used to inject a gas of this kind.

5 To this end, in accordance with the present invention, the safety valve of the type described hereinabove is remarkable in that said wall at least substantially parallel to said fixing face and carrying said first annular sleeve has a hole through it enabling
10 means to act from one of the two separate spaces on said bottom of said sealing member.

The sealing member of the safety valve can therefore be deformed, in order to open it, using the means acting on the bottom of said sealing member. As described
15 hereinafter, this increases the possibilities of use of the valve known in itself described hereinabove.

The aforementioned means can be a mechanical tool, in the form of a rod, for example, inserted through said hole in said wall and adapted to be pressed onto the bottom
20 of said sealing member.

Obviously, if said tool is a gas injector pipe, a gas of the above kind can be injected via the safety valve.

Said means acting on the bottom of said sealing member can instead be in the form of a pressure generator adapted to generate a high pressure in said space and
25 acting on said bottom through said hole.

Said base preferably has a lateral skirt delimited at one end by a plane annular face and at the other end by a bottom. Either said plane annular face or said bottom
30 provides an attachment surface on said impervious sheet.

In the case where said bottom provides the attachment surface on said impervious sheet, said bottom advantageously has an annular plane peripheral part providing an attachment surface proper on said impervious
35 sheet and a depressed central part causing a central

depression to appear in said bottom.

To protect the active part of the valve the interior space delimited in said base by said lateral skirt and by said bottom encompasses the entirety of said sealing member.

Of course, for the valve to be able to exercise its function of establishing communication between said separate spaces, as appropriate, said impervious sheet has an opening in it either inside said annular face or inside said annular plane peripheral part. In the latter case, the opening is sized to enable said tool to be passed through it.

Said safety valve in accordance with the present invention can additionally have the following features:

- the second sleeve can be inside or outside the first;
- openings establishing communication with the inside of the valve or the outside are provided inside or outside said sleeves, in the base and in said sealing member;
- said sealing member is in the form of a cap that can be clipped to said base;
- the sealing member and the base can be made from a synthetic material, for example by injection moulding;
- to ensure a good seal in the closed position, at the level of the sleeves, it is advantageous for at least one of them to have on its surface that faces the other at least one peripheral bead acting like an O-ring;
- it is advantageous for at least one of the sleeves to have an elliptical axial section, at least in the contact region.

The figures of the accompanying drawings show clearly how the invention can be put into effect. In the figures, identical reference numbers designate similar components.

Figure 1 is a view in axial section of a valve in accordance with the present invention, before its two

component parts are assembled together.

Figure 2 is a view, also in axial section, of the valve from figure 1, after its two component parts have been assembled together.

5 Figure 3 is a view of the valve from figures 1 and 2 in axial section in an application to evacuating an enclosure and degassing the products contained in said enclosure.

10 Figure 4 is a view of the valve from figures 1 and 2 in axial section in an application to injecting a gas into an enclosure.

 The valve in accordance with the present invention shown in figures 1 and 2 includes a fixed base 1 that is relatively rigid and is adapted to be fixed to an impervious sheet (see 19 and 23 in figures 3 and 4), for example by thermal or ultrasonic welding, and a relatively flexible sealing member 2 having the shape of a hood and adapted to be clipped onto said fixed base 1. The base 1 and the sealing member 2 can be moulded from synthetic materials.

20 The sealing member 2 has a flexible and elastic bottom 3 extended by a lateral wall 4 terminated peripherally by a clipping rim 5. Where it merges with the lateral wall 4, the bottom 3 has peripheral holes 6 through it. Inside the line of holes 6 the bottom 3 is attached to a sleeve 7 projecting from the same side as said clipping rim 5.

 The base 1 includes a lateral skirt 8, for example a cylindrical or conical skirt, delimited at one end by a plane annular face 9 and at the other end by a bottom 10. This bottom 10 has an annular plane peripheral part 10A and a depressed central part 10B with an outwardly open central depression 11. The interior space 12 of the base 1 is therefore open to the exterior on one side through the plane annular face 9 and closed off on the

other side by the bottom 10A, 10B. The plane annular face 9, the annular plane peripheral part 10A and the central part 10B are at least substantially parallel.

5 Where the parts 10A and 10B of the bottom 10 merge there is a clipping rim 13 adapted to cooperate with the clipping rim 5 of the sealing member 2 to fasten the latter to the base 1.

10 Holes 14 through the periphery of the central part 10B of the bottom 10 establish communication between the central depression 11 and the interior space 12 (see figure 1). In accordance with one important feature of the present invention, said central part 10B has a central hole 15 through it also establishing communication between the central depression 11 and the interior space 12.

15 Outside the line of through-holes 14 but inside the clipping rim 13, the central part 10B of the bottom 10 is attached to a sleeve 16 adapted to cooperate with the sleeve 7 of the sealing member when the latter is mounted by clipping the rims 5 and 13 to the base 1 (see figure 2),
20 to control communication between the central depression 11 and the interior space 12. Note that when the sealing member 2 is attached to the base 1 (figure 2), said sealing member 2 is completely inside the interior space 12 of the base 1 and is surrounded and protected by the lateral skirt 8.
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In the (non-obligatory) embodiment of figures 1 and 2, the sleeves 7 and 16 cooperate via the outside lateral face 7E of the sleeve 7 of the sealing member 2 and the inside lateral face 16I of the sleeve 16 of the base 1.
30 If the sealing member is not subjected to any external force, the external lateral face 7E is pressed elastically against the internal lateral face 16I. Said lateral faces 7E and 16I can separate elastically when the bottom 3 of the sealing member 2 is domed outwards or can bear partly
35 against each other when said bottom 3 is drawn towards the

bottom 10 of the base 1. In the latter case, the valve provides a seal between the depression 11 and the interior space 12.

5 To assure a good seal, the facing lateral surfaces 7E and 16I of the sleeves 7 and 16 have an elliptical section, at least in their area of mutual contact. The seal can be enhanced by moulding a bead 17 acting like an O-ring on the inside surface 16I of the sleeve 16, for example.

10 To make the bottom 3 of the sealing member 2 more flexible, and thus to increase the sensitivity of the valve in accordance with the invention, a peripheral groove 18 is provided on the outside face of the sealing member 2, near the sleeve 7.

15 Figure 3 shows a first application of the valve in accordance with the invention, as shown in figure 2, in which the valve is attached and sealed through the plane annular face 9 of its base 1 to a sheet 19 (for example a polymer film) which is gas-tight and separates two spaces
20 20 and 21. In figure 3, the space 20 is under said sheet 19 and communicates freely with the central depression 11 of the base 1. In figure 3, the base 21 is above said sheet 19 and communicates freely with the interior space 12 of the base 1 via an opening 22 in said sheet 19, inside
25 the plane annular face 9.

Accordingly, when the pressure of the gas contained in the space 20 is greater than the pressure of the gas in the space 21, the bottom 3 bulges outwards, because of the communication holes 14 and 15. As a result
30 the gas can flow from the space 20 to the space 21 through the holes 14 and 15, between the sleeves 7 and 16 and then through the holes 6 and the opening 22.

On the other hand, if the pressure of the gas in the space 20 is less than the pressure of the gas in the
35 space 21, the bottom 3 is drawn towards the bottom 10 by

virtue of the communication established across said bottom 3 by the holes 14 and 15 and by the opening 20 and the sleeves 7 and 16 are pressed elastically together to provide a perfect seal between said spaces 20 and 21.

5 In this first application shown in figure 3, the valve of the invention is therefore particularly suitable for use on the sheet 19 of packaging bags or sachets containing products that generate gas. In this case the space 20 represents the interior of the bag or sachet and
10 the space 21 the surrounding atmosphere.

The product (not shown) enclosed in a sachet of this kind is initially in a vacuum so that the initial position is as described above with said valve isolating the two spaces 20 and 21. Note that the interior 20 of the
15 sachet can be evacuated either in an enclosure when the sachet is filled and before the latter is closed or through the valve after filling and closing the sachet.

If the packaged product gives off gas, and if the pressure of the latter becomes greater than atmospheric
20 pressure, the valve opens to exercise its safety valve function. The same thing happens if the sachet is squeezed, enabling the aroma of the packaged product to be perceived, carried by the gases then leaving the valve.

In the second application of a valve in accordance with the present invention, shown in figure 4,
25 the annular peripheral part 10A of the bottom 10 of the base 1 of the valve is attached and sealed to a sheet 23 that is impervious to gases (similar to the sheet 19) and separating two spaces 24 and 25.

30 In figure 4, the space 24 is under the wall 23 and communicates freely with the interior space 12 of the base 1. In figure 4, the space 25 is above the wall 23 and communicates freely with the central depression 11 of the base 1 via an opening 26 in said wall 23 inside the annular
35 peripheral part 10A. Moreover, said opening faces the

central hole 15 and is larger than the latter.

Accordingly, if the pressure of the gas contained in the space 24 is greater than the pressure of the gas contained in the space 25 the bottom 3 is pushed towards
5 the bottom 10 and the sleeves 7 and 16 are pressed elastically together to provide a perfect seal between the spaces 24 and 25.

If a rod 27 is inserted from the space 25 through the opening 26 and the central hole 15, it is possible to
10 push the bottom 3 back elastically towards the space 24. This moves the sleeve 7 away from the sleeve 16 and opens the valve, establishing communication between the space 24 and the space 25 through the holes 6, between the sleeves 7 and 16 and then through the holes 14 and 15 and the
15 opening 26.

If said rod 27 is a gas injector pipe (for injecting nitrogen, carbon dioxide, etc) it is possible to inject this gas into the space 24 because the valve is in then opened by mechanical pressure of the rod 27 on the
20 bottom 3 of the sealing member 2. Of course, following this injection of gas, the valve closes in the manner described above, as soon as the rod 27 is removed from contact with the bottom 3, because the pressure in the space 24 is greater than that in the space 25.

25 In this second application shown in figure 4 the valve of the invention is therefore particularly suitable to be used on the sheet 23 of packaging bags or sachets containing products that have to be packaged in a gaseous atmosphere at a pressure higher than atmospheric pressure.
30 In this case, the space 24 represents the interior of the bag or sachet and the space 25 the surrounding atmosphere.

The product (not shown) contained in a sachet of this kind is packaged in a sachet of this kind at atmospheric pressure, after which the required gas is
35 injected into the space 24 via the pipe 27. The pressure

rise caused by the gas injected into said space 24 then closes the valve after removal of said injector pipe 27, and therefore provides a seal between the spaces 24 and 25.

5 Although, in figure 4 and in the corresponding description, the means adapted to act on the bottom 3 of the sealing member 2 are in the form of a rod 27 that can bear mechanically on said bottom 3 to push it back and open the valve, it goes without saying that said means could
10 consist of a pressure generated in the space 25 and sufficiently high to push back the bottom 3, by virtue of the communication established between said bottom and the space 25 via the holes 15 and 26.

CLAIMS

1. Safety valve (1, 2) adapted to be disposed on an impervious sheet (19, 23) separating two separate spaces (20, 21; 24, 25) and including:

- 5 - a relatively rigid base (1) adapted to be fixed to said impervious sheet (19, 23) by one attachment surface (9, 10A) and having a wall (10B) at least substantially parallel to said attachment surface and carrying a first annular sleeve (16); and
- 10 - a relatively flexible and elastic sealing member (2) adapted to be attached to said base (1) and having a second annular sleeve (7) closed by a bottom (3) and adapted to cooperate with said first annular sleeve (16) to provide either a seal between or communication between
- 15 said separate spaces, said second annular sleeve (7) being pressed in sealed manner onto said first annular sleeve (16) or separated from the latter according to elastic deformations to which said bottom (3) closing said second annular sleeve (7) is subjected,
- 20 characterised in that said wall (10B) at least substantially parallel to said fixing face and carrying said first annular sleeve (16) has a hole (15) through it enabling means (27) to act from one (25) of the two separate spaces on said bottom (3) of said sealing
- 25 member (2).

2. Safety valve according to claim 1 characterised in that said means acting on the bottom (3) of said sealing member (2) comprise a mechanical tool (27) inserted through said hole (15) and adapted to bear on said

30 bottom (3).

3. Safety valve according to claim 1 characterised in that said means acting on the bottom (3) of said sealing member (2) are in the form of a pressure in said space (25) and acting on said bottom (3) through said

35 hole (15).



4. Safety valve according to any one of claims 1 to 3 characterised in that said base (1) has a lateral skirt (8) delimited at one end by a plane annular face (9) and at the other end by a bottom (10) and in that said
5 plane annular face (9) provides an attachment surface on said impervious sheet (19).

5. Safety valve according to any one of claims 1 to 3 characterised in that said base (1) includes a lateral skirt (8) delimited at one end by a plane annular face (9)
10 and at the other end by a bottom (10) and in that said bottom (10) provides an attachment surface on said impervious sheet (23).

6. Safety valve according to claim 5 characterised in that said bottom (10) has an annular plane peripheral part (10A) providing an attachment surface proper on said
15 impervious sheet (23) and a depressed central part (10B) causing a central depression (11) to appear in said bottom (10).

7. Safety valve according to any one of claims 4 to 6 characterised in that the interior space (12) delimited in said base (1) by said lateral skirt (8) and by
20 said bottom (10) encompasses the entirety of said sealing member.

8. Safety valve according to claim 4 characterised in that said impervious sheet (19) has an opening (22) through it inside said plane annular face (9).
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9. Safety valve according to claim 6 characterised in that said impervious sheet (23) has an opening (26) through it inside said annular plane peripheral part (10A)
30 to enable passage of said tool (27).

10. Application of the safety valve specified in claim 2 characterised in that said tool (27) is a gas injector pipe.

