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5 The present invention relates in general to inflatable cushions for packages, and in particular to an inflatable cushion comprising two flexible walls welded together at their edges and an inflation valve comprising two flexible sheets welded together, so as to form a conduit open at its two ends for insertion of an inflation tube or for inflation by a directed let of air.

10 Such an inflatable cushion may be used advantageously for packing articles of different dimensions and shapes by wedging same in a rigid box.

15 An inflatable cushion of the above kind is already known from the state of the art, in particular from FR 2 686 322, in which the inflation valve located between two flexible walls forming the cushion is welded at: one of its ends to the two flexible walls at their edges, leaving an aperture of the conduit open to the outside for insertion of an inflation tube.

20 This known inflatable cushion comprises two flexible guide tabs that are needed for insertion of an inflation tube into the conduit. These flexible guide tabs project from one edge of the cushion and are welded at inflation valve to the edges of the flexible walls forming the cushion.

However, this known cushion has several disadvantages.

25 To begin with, it is required that an inflation tube be inserted into the interior of the conduit of the inflation valve of this known cushion. To insert such an inflation tube, it is necessary to first spread the flexible guide tabs. Thus, it becomes difficult: to realize an automatic insertion of the tube into the valve and it is not possible to inflate the cushion without inserting the inflation tube.

30 Further, the insertion of the inflation tube into the cushion, via the conduit of the inflation valve, for inflating or deflating it, produces at the level of the opening to the outside of the conduit of the valve a tension, which acts upon the welded edges of the flexible cushion walls, this tension being capable of causing the edges to tear at this level.

35 Finally, the inflation valve of this cushion can be positioned only on one edge of the latter, which is sometimes difficult to realize, when the cushion has a complex shape, and which can become a disadvantage in the conception of a package with an inflatable cushion.

40 To remedy to the drawbacks of the precited state of art, the present

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invention proposes a new inflatable cushion in which the inflation valve is located such that the inflation tube could be automatically inserted into the interior of the inflatable cushion without producing tension upon the welded edges of the flexible cushion walls.

- 5 More particularly, according to the invention, the inflatable cushion includes a pair of flexible walls welded together at their edges, an inflation valve including a pair of flexible sheets welded together so as to form a conduit open at both ends, said inflation valve being affixed to an internal face of one of said flexible walls at a distance from said welded
10 edges of said cushion, and opens to this outside of said cushion through an aperture provided in said one flexible wall to which said inflation valve being affixed to permit inflation of the cushion by insertion of an inflation tube or by a directed jet of air.

- Also, advantageously, in accordance with the complexity of shape of the
15 cushion and its use, the aperture provided in said flexible wall to which said inflation valve is affixed, is placed in the appropriate region of said flexible wall.

- In particular, according to an embodiment of the cushion object of the invention said aperture in said one flexible wall to which said inflation
20 wall is affixed is located in an angle region of said cushion.

It is interesting to note that the insertion of the tube into the valve of the cushion according to the invention, for inflating or deflating it, acts in compression upon the welded edges of said flexible wall that contributes to held it bound.

- 25 Further features, objets and advantages will be evident from the following detailed description of the preferred embodiments of the present invention taken in conjunction with the accompanying drawings, in which :

- figure 1 is a partial plan view of a cushion in accordance with the invention, in a deflated state,
- 30 - figure 2 is an plan view of a first embodiment of the inflation valve of the inflatable cushion in accordance with the invention, into which an inflation tube is inserted,
- figure 3 is a plan view of a second embodiment of the inflation valve of the inflatable cushion in accordance with the invention, into which an
35 inflation tube is inserted.

Shown in Figure 1 is an inflatable cushion comprising two walls 10 of a hot or high-frequency weldable, flexible plastic, which are welded together at their edges along a weld line 12 defining the peripheral edge

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- of the cushion. This inflatable cushion comprises an inflation valve 20 consisting of two sheets 21, 22 of a hot or high-frequency weldable, flexible plastic (see Figures 2, 3), which are welded together along two essentially parallel weld lines 24, so as to form a conduit 23 for an
- 5 inflation tube 30 that is open at both ends. The inflation valve 20 is welded to one internal face of one of flexible cushion walls 10, at a distance from weld line 12 of the cushion, and opens to the outside of the latter through an aperture 11 which is provided in flexible wall 10, to which valve 20 is welded.
- 10 The weld seam 13 of inflation valve 20 on the flexible cushion wall 10 describes a circle, which surrounds aperture 11 that is provided in flexible wall 10, leaving flexible sheets 21, 22 of inflation valve 20 open at the level of conduit 23, so as to permit the insertion of an inflation tube 30 into the interior of the cushion through aperture 11 and conduit 23.
- 15 Shown in Figure 2 is a first embodiment of an inflation valve 20. According to this embodiment, the flexible sheets 21, 22 forming the inflation valve 20 are of different lengths. These sheets 21, 22 are arranged side by side and welded together along weld lines 24, so that at one end of conduit 23 of inflation valve 20, the transverse edges 21a, 22a of
- 20 flexible sheets 21, 22 are offset from one another in the axial direction of the valve. At the other end, the edges 21b, 22b of sheets 21, 22 overlies one another. This inflation valve is positioned in the interior of the inflatable cushion (see Figure 1), so that the flexible sheet 22 of inflation valve 20 with its edge 22a set back from edge 21a of the other flexible sheet 21, is
- 25 positioned adjacent to the internal face of flexible cushion wall 10, to which the inflation valve is affixed, the offset edge 22a being adjacent to an edge of aperture 11 that is provided in said flexible wall 10.
- The weld seam 13 of inflation valve 20 on wall 10 is such that on one portion of circle 13a, wall 10 and sheet 21 including forward edge 21a are
- 30 welded together, that on two portions of circle 13b arranged on both sides of conduit 23, flexible wall 10 and thin sheets 21, 22 are welded together, and that over the width 13c of conduit 23, only wall 10 and adjacent sheet 22 are welded together, while leaving the other sheet 21 forming the valve detached, so as leave the conduit open.
- 35 To make an inflatable cushion in accordance with the invention, as shown in Figure 1, which comprises an inflation valve as shown in Figure 2, and in which two flexible walls 10 are peripherally welded together, the

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following steps are carried out:

- a) - A resist 26 is provided in conduit 23 of inflation valve 20 at its end which corresponds with transverse edges 21a, 22a of offset flexible sheets 21, 22;
- 5 b) - The inflation valve 20 is placed against the internal face of flexible cushion wall 10, so that flexible sheet 22 with its set back edge 22a is positioned adjacent to the internal face of flexible wall 10, and that the end of conduit 23 provided with resist 26 is positioned at the aperture 11 provided in flexible wall 10;
- 10 c) - The inflation valve 20 is welded to flexible wall 10 along welding line 13, which surrounds aperture 11 of flexible wall 10, and which covers resist 26.

The resist 26 may be made in the form of an individual tab of silicon or even paper. In this instance, the resist 26 is pulled out of conduit 23 through aperture 11 in flexible wall 10, after the welding step (c) of the foregoing process.

According to a variant of this method, the resist 26 is formed by printing an insulating material, such as, for example, a fast-drying varnish, on one of the opposite internal faces of sheets 21, 22 forming the inflation valve.

20 This printing occurs in step (a) of the above-described method.

When welding valve 20 to flexible wall 10, this resist 26 allows, in an advantageous manner, to leave the two sheets 21, 22 of the valve separated from one another at conduit 23, so as to thus permit the insertion of a flexible inflation tube into the interior of this valve. A major feature of

25 this invention is that the construction of valve 20 is such that a directed jet of air from an air nozzle (not shown) can be aimed at the outer end of the conduit 23 and this jet of air will open the conduit 23 and inflate the cushion without the necessity of inserting an inflation tube into the conduit 23. This feature permits automatic inflation or very fast manual

30 inflation.

Shown in Figure 3 is another embodiment of an inflation valve of the inflatable cushion in accordance with the invention. In this embodiment, the flexible sheets 21, 22 forming this valve have the same dimensions. These sheets 21, 22 are superposed and welded together along welding

35 lines 24, so as to form conduit 23. One of these flexible sheets 22 includes here a circular opening 25, which is located at one end of conduit 23 between the two welding lines 24. This inflation valve is located in the interior of the flexible cushion in accordance with the invention, so that flexible sheet 22 with opening 25 is adjacent to the internal face of

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flexible wall 10, to which the inflation valve is attached, with opening 25 being opposite aperture 11 provided in flexible wall 10. In this instance, the thin sheets 21, 22 and flexible wall 10 are welded along a circular portion surrounding the two overlaid apertures 11, 25, and covering the two welding lines 24 that form conduit 23. It should be noted that at
5 conduit 23, only the flexible wall 10 and thin wall 22 adjacent to the inflation valve are welded together, whereas the other thin sheet 21 remains detached, so that an inflation tube 30 can be inserted or a directed air jet can pass therethrough.

10 As one will note, a common characteristic of the inflation valves shown in Figures 2 and 3 is that the welding lines 24 of flexible sheets 21, 22 are locally spaced apart from one another, so that the conduit 23 of flexible inflation tube 30 that is created by welding lines 24 has a widening, which is located at a distance from the free end of the conduit placed in the
15 interior of the cushion. This has the advantage that, when the inflation of the cushion is stopped and the tube 30 is still partially engaged in conduit 23, the two flexible sheets 21, 22 rest against one another due to a distortion that is caused in the vicinity of the free end of the conduit in the widening, so as to obstruct immediately the conduit and to thus
20 prevent a partial deflation of the cushion.

Once inflated, the inflatable cushion of this invention has advantageously a double seal at aperture 11 in flexible wall 10.

A first seal is formed by the valve itself, which is selfclosing by the two flexible sheets 21, 22 overlying one another.

25 A second seal is ensured by sealingly applying flexible sheet 21 of the inflation valve, which is outermost with respect to flexible wall 10, to aperture 11, so as to obstruct same.

It is understood that the present invention is by no means limited to the embodiments described and illustrated therein, but that a person skilled in
30 the art will be able to conceive any variant within its scope.

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CLAIMS

1. An inflatable cushion including a pair of flexible walls (10) welded together at their edges (12), an inflation valve (20) including a pair of flexible sheets (21, 22) welded together so as to form a conduit (23) open at both ends, characterized in that said inflation valve (20) is affixed to an internal face of one of said flexible walls at a distance from said welded edges (12) of said cushion, and opens to this outside of said cushion through an aperture (11) provided in said one flexible wall (10) to which said inflation valve is affixed to permit inflation of the cushion by insertion of an inflation tube or by a directed jet of air.

2. An inflatable cushion according to claim 1, characterized in that said inflation valve (20) is welded to said flexible wall (10) along a welding line (13) which surrounds said aperture (11) provided in said flexible wall (10) and which leaves separated said pair of flexible sheets (21, 22) of said valve (20) at said conduit (23) of said valve (20).

3. An inflatable cushion according to claim 1 or 2, characterized in that at one end of said conduit (23) of said inflation valve (20), the transverse edges (21a, 22a) of said flexible sheets (21, 22) forming said valve are shifted from each other, said flexible sheet (22) including the inner edge (22a) being adjacent to the internal face of said one flexible wall to which said inflation valve (20) is affixed, said inner edge being located in the vicinity of the edge of said aperture (11) provided in said one flexible wall (10).

4. An inflatable cushion according to claim 1 or 2, characterized in that said inflation valve (20) includes an aperture (25) formed in one of said flexible sheets (22) which is located adjacent to the internal face of said one flexible wall (10) to which said inflation valve is affixed, said aperture (25) being located at one end of said conduit (23), between the welding lines (24) forming said conduit, and facing said aperture (11) provided in said one flexible wall (10) to which said inflation valve (20) is affixed.

5. An inflatable cushion according to any one of claims 1 to 4, characterized in that said aperture in said one flexible wall to which said inflation wall is affixed is located in an angle region of said cushion.



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6. An inflatable cushion according to any one of claims 1 to 5, characterized in that, in the inflated condition, it provides at said aperture (11) provided in said one flexible wall (10) a first seal established by the mutual engagement of said pair of flexible sheets (21, 22) of said inflation valve, and a second seal established by the engagement of one of said flexible sheets of said inflation valve with said aperture (11) so as to obstruct same.

7. A method for manufacturing an inflatable cushion according to anyone of claims 1 to 3, wherein the flexible walls, positioned one against the other, are peripherally welded together, characterized in that it includes the steps consisting in :

a) providing an interference member (26) in said conduit (23) of said inflation valve (20), at the end of said conduit (23) corresponding to the shifted transverse edges (21a, 22a) of said flexible sheets (21, 22),

b) positioning said inflation (20) against the internal face of one of said flexible walls (10) provided with an aperture (11) in such manner that said flexible sheet (22) of said valve including the inner edge (22a) is located adjacent to the internal face of said flexible wall (10), and that said interference member (26) is located at said aperture (11),

c) welding said inflation valve (20) to said flexible wall (10) along a welding line (13) which surrounds said aperture (11) of said flexible wall (10) and extends across said interference member (26).

8. A method according to claim 7, characterized in that said interference member (26) is made of an individual tab in an insulating material, and it further includes a final step of extracting said interference member (26) from said conduit (23) via said aperture (11) of said flexible wall (10).

9. A method according to claim 7, characterized in that said step a) further includes the printing of an insulating material on one of said opposite internal faces of said flexible sheets (21, 22) forming said inflation valve (20) at the end of said conduit (23) corresponding to said shifted transverse edges (21a, 22a), in order to form said interference member (26).

