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(54) **DEVICE FOR POSITIONING AN ELEMENT RELATIVELY TO A SURFACE, METHOD FOR
OPERATING SUCH DEVICE, AND ASSEMBLY KIT**

VORRICHTUNG ZUM POSITIONIEREN EINES ELEMENTS RELATIV ZU EINER OBERFLÄCHE,
VERFAHREN ZUM BETRIEB SOLCH EINER VORRICHTUNG, UND BAUSATZ DAFÜR

DISPOSITIF PERMETTANT DE POSITIONNER UN ÉLÉMENT PAR RAPPORT À UNE SURFACE,
PROCÉDÉ DE FONCTIONNEMENT D'UN TEL DISPOSITIF, ET KIT DE MONTAGE

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a device with inflatable air cushion members for positioning an element relatively to a surface, a method for operating such a device, and an assembly kit. The air cushion members are made of a flexible but not readily stretchable air tight sheet material in hose-connection with an inflation tool. The inflatable air cushion member is a bag unit comprising opposite layers of said sheet material provided face to face and joined along an edge area to form a reinforced double layer edge. The bag unit is flat in deflated condition and attains a rounded form when inflated.

BACKGROUND OF THE INVENTION

[0002] In International patent application WO95/13448, and as illustrated in FIG. 7, an auxiliary tool and a use of the tool is disclosed for adjusting the position of frames 20, for example doors and windows, in buildings by placing inflatable cushion members 2 on either side of the frame within a corresponding opening 18 in a wall, potentially supported by wedges 19. For example, once positioned, the window frame 18 is fastened in the wall opening 18 by screws through pre-drilled holes in the frame. The cushion member 2 is a flat bag with two layers of a tough and flexible but not readily stretchable material placed face to face and joined along edges made. It is in hose connection with a manually operable inflation balloon and a bleeding valve for inflating and deflating the bag for change its shape between flat and round shapes. If the system in WO95/13448 is used under a broad frame two or more of the cushion members are used. Although, the system yields high flexibility for adjustments, precise adjustment of all the separate cushion members is difficult, especially, if the frame is heavy or bendable and needs more than two cushion members on a side.

[0003] International patent application WO99/15741 discloses alternative cushion members that comprise stiffening elements in the cushion members in order to facilitate positioning of the cushion members in locations that are not readily accessible or not easy visible. The stiffened cushion members are optionally provided as arrays of cushioning members in order to increase the length thereof such that positioning is made easier.

[0004] In either of the two above systems, the precise adjustment of a large frame requires manual operation of multiple pumps at different locations with shifts between inflation and deflation in dependence of the desired movement of the frame, which is a difficult task and typically requires more than one person. It would be desirable to provide a system that is more user-friendly.

[0005] US patent No. US4275869 discloses a lifting cushion apparatus with multiple inflatable compartments with intermediate weldings between the compartments

in order for the apparatus to retain load stability and for implicitly being strong and useful for heavy loads. This device is not properly formed and dimensioned for windows and doors when mounted in wall openings.

[0006] US patent application US2004/217338 discloses a lifting device for lorries with a foot piece having an air inlet into air cushion members for connection to an inflation hose. The inlet is pointing upwards in order for the foot piece to be accessible beside the wheels of a lorry. A similar principle of an upward pointing hose connector is disclosed in FR2839711 in order for the hose connector to be accessible when the long extension of the lifting device is pushed under a wardrobe. For adjusting doors and windows in wall openings, such principle of the hose connection pointing out laterally from the flat side is not optimum, as the inflation tool needs to be inserted fully, which is not possible with such device, as the laterally arranged foot piece for the hose would prevent this.

[0007] In EP0568465 a lifting device is disclosed with two long and narrow inflatable plates. Such long and narrow plates are not useful for adjustment of doors and windows in wall openings, as the long and narrow plates would extend far out from either side of the window or door and, therefore, would not lift the window or door reliably. Furthermore, a hose connector at one end where the end is flat and provided by welding, implies a weak point for breakage of the welding at the transition from the welded foils to the foot piece of the air inlet with an increased risk for leakage.

[0008] Accordingly, none of these devices are optimized for adjustment of the position of windows and doors during mounting. There is a general need for further improvement.

DESCRIPTION / SUMMARY OF THE INVENTION

[0009] It is therefore an objective of the invention to provide a general improvement in the art. Especially, it is an objective to provide a device with inflatable air cushion members for positioning an element relatively to a surface, for example vertical or horizontal surface, and method for operating such device, where the device is easier to operate than the prior art. These and further objectives are achieved with a method and device for positioning an element relatively to a surface as described in the claims and outlines in more detail in the following.

[0010] In particular, it is pointed out that the invention as defined in the claims differs from the above mentioned US4275869 in that the weldings are only along the edge regions, which is a much simpler and production-wise cheaper construction than the technical solution with multiple compartments as in US4275869.

[0011] Furthermore, the device is optimized for the stated use in that the foot piece for the hose is at the fold, which yields structural stability and allows the device to be fully inserted into narrow slits between a window or

door in a frame opening.

[0012] The device comprises a plurality of inflatable air cushion members of a flexible but non-stretchable air tight sheet material in hose-connection with an inflation tool, the inflation tool comprising an air pump, for example a hand operated balloon, a bellows, for example foot-operated, or an electrical compressor pump.

[0013] Each inflatable air cushion member is formed as a bag unit comprising opposite layers of said sheet material provided face to face and joined along an edge area to form a double layer edge. The bag unit is flat in deflated condition and attains increasing thickness in dependence of the air pressure in it. The air cushion members of the plurality of inflatable air cushion members are separate from each other such that the edge area of a first cushion member of the plurality of inflatable air cushion members is entirely disjoint from the edge area of a second cushion member of said a plurality of inflatable air cushion members. This is in contrast to the prior art as disclosed in WO99/15741.

[0014] The first and second cushion members are connected through the hose-connection to a common air pump as part of the inflation tool. With the common air pump, the first and second cushion members are inflated. The inflation tool may additionally also comprise a valve arrangement for deflating the air cushion members. Alternatively, valves for deflation are provided remote the inflation tool, for example near the air cushion members or on the hose that connects the air cushion members with the inflation tool. An example is a valve arrangement near the inflation tool.

[0015] Optionally, the device is configured for inflation of said first and second cushion member simultaneously by the common air pump. Alternatively or additionally, the device is configured for inflation of said first and second cushion member sequentially by the common air pump. Optionally, the inflation tool is provided with a regulator to regulate whether the air cushion members are inflated all simultaneously, inflated individually or in groups according to a sequence. An example is a sequence comprising inflating said first cushion member by the common pump while the second cushion member is deflated; subsequently inflating said second cushion member by the common air pump. This way, one side of an element is lifted first, after which the second side is lifted. Optionally, the first cushion member is deflated prior to inflating the second cushion member.

[0016] In a further embodiment, the device is configured for a sequence of inflation and deflation of the first cushion member followed by inflation and deflation of said second cushion member. For example, this is achieved by providing a corresponding regulator in the inflation tool or external to the inflation tool. The regulator is configured for manual adjustment by a keypad or by knobs. Alternatively, the regulator is connected to an electronic controller comprises programs or is programmable for special sequences of inflation and deflation of air cushion members or group of air cushion members

one after the other. In some embodiments, the controller is also connected to an electrical common air pump, such as a compressor, in order to start and stop the common air pump when not used for inflation during the sequential inflation and deflation and before and after such sequence.

[0017] Thus, the system is a manual system in its simple version with a hand operated squeeze balloon or foot operated bellows and with manually operated valves for inflation and deflation. In more advanced forms, the device comprises an electrical, hydraulic or pneumatic driven common air pump, which is controlled by a programmable electronic controller, functionally connected to the common air pump and to a regulator for regulation of inflation and deflation of the hose-connected air cushion members or groups of air cushion members. However, it is also possible to use manually operated valves and an electrical driven compressor. Thus, various mixes of parts the described embodiments is also possible. The device has a large versatility and flexibility in adjustment to the actual use.

[0018] In a further embodiment, the inflation tool is configured for selective shift between a first inflation mode and a second inflation mode by the common air pump; wherein the first mode is inflation of the first and second cushion member simultaneously and the second mode is inflation of the first and second cushion member sequentially one after the other.

[0019] Instead of the first and second air cushion members, a first group and a second group of air cushion member is inflated and deflated similarly as described above, where the first and the second group are subgroups of the plurality of inflatable air cushion members. For example, the inflation tool is configured for inflating the two subgroups one after the other.

[0020] In some embodiments, the device comprises a regulator, optionally as part of the inflation tool, the regulator having an air inlet, which is connected to the common pump, and a first and a second air outlet, the first air outlet being connected to the first air cushion member or to a first group of air cushion members and the second outlet being connected to the second air cushion member or to a second group of air cushion members. The regulator is adjustable to selectively inflate one or the other of the first and second air cushion member or group of air cushion members at a time.

[0021] For the device, various accessories can be provided as an assembly kit according to claim 10.

[0022] Such assembly kit is easy to purchase and eas- es assembly, as it contains the necessary components for the device.

[0023] In the method for operating the device, the first and second cushion member are connected through said hose-connection to a common air pump as part of the inflation tool and are correspondingly inflated simultaneously or sequentially. For example, the first cushion member is inflated while the second cushion member is deflated; then the first cushion member is deflated and,

subsequently, the second cushion member is inflated while the first cushion member stays deflated. Finally, the second cushion member is deflated to a state where the first and the second cushion members both are deflated. This sequence is illustrative but only one example among many others, especially if there are more than two air cushion members. With a corresponding regulator, even complicated inflation and deflation sequences can be performed, especially if controlled by a programmable electronic controller that is functionally connected to the regulator for regulating various valves in the regulator for inflation and deflation. The device according to the invention is suitable for lifting and adjusting a variety of elements, for example machines, frames, doors, windows, walls, and furniture, for example tables. The air cushion members are placed between the element and the support and can be used for a vertical lift or for non-vertical horizontal adjustment or both. For example, on air cushion member is placed under each corner of the element or under each leg of a table.

SHORT DESCRIPTION OF THE DRAWINGS

[0024] The invention will be explained in more detail with reference to the drawing, where

- FIG. 1 illustrates a device with a plurality of air cushion members and a common pump, where a) illustrates a system with two air cushion member connected by a T-piece and with a valve system, b) illustrates the two air cushion members without separate valve for simultaneous inflation, c) illustrates a system with three air cushion members; d) illustrates a system with four air cushion members;
- FIG. 2 illustrates a device with a) two air cushion members, b) three air cushion members and c) four air cushion members that can be filled separately or in groups by a regulator;
- FIG. 3 illustrates an air cushion member according to the invention;
- FIG. 4 illustrates an air cushion member, not in accordance with the invention, with a) one, b) two, and c) three joints or d) a cross joint for providing partial volumes;
- FIG. 5 illustrates an example of a T-piece connector, cross connector, Y-piece connector and a hose for the hose-connection;
- FIG. 6 illustrates various common air pumps;
- FIG. 7 is a prior art image of WO95/13448, explained in detail in the introduction, where separate air cushion members are inflated by an air pump on each air cushion member.

DETAILED DESCRIPTION / PREFERRED EMBODIMENT

[0025] FIG. 1a illustrates a device 1 with a first air cushion member 2a and a second air cushion member 2b interconnected by a hose-connection 5 including a first hose 5a and a second hose 5b and a T-piece 3, the T-piece connection 3 further connecting the first hose 5a and the second hose 5b with a third hose 5c that is connected to an air pump 6, which is a common air pump 6 as it is used to inflate both the first air cushion member 2a and the second air cushion member 2b.

[0026] In the figuration shown in FIG. 1a, this common air pump 6 can be used to inflate the first air cushion member 2a and a second air cushion member 2b simultaneously. However, this need not to be the case, as the T-piece 3 or the first hose 5a and the second hose 5b can optionally be supplemented by a valve arrangement with a first valve 7a and a second valve 7b to regulate the inflation such that only the first air cushion member 2a is inflated by the common air pump 6 or only the second air cushion member 2b is inflated by the common air pump 6, or the common air pump 6 is used for sequential inflation such that the first air cushion member 2a is inflated first and subsequently the second air cushion member 2b. Such valve arrangement 7a, 7b is optionally operated manually or automatically via a controller 8, typically electronic controller, although an automatic mechanical controller, such as hydraulic or pneumatic, is also possible, in principle.

[0027] Examples of a common air pump 6 is a hand operated bellows or balloon, such as disclosed in WO95/13448, or an electrical air pump, or a hydraulic or pneumatic driven air pump.

[0028] Optionally, in order to control the deflation, deflation valves 9a, 9b are provided, either manually operated or also controlled by the controller 8.

[0029] The common air pump 6 is part of an inflation tool 4. Optionally, the inflation tool 4 is also connected to the controller 8. In some embodiments, the controller 8 controls the start and stop of the common air pump 6 as part of the inflation tool 4, and also the first valve 7a and the second valve 7b, and optionally also the first deflation valve 9a and the second deflation valve 9b. In this case, the common air pump is an electrical air pump, or a hydraulic or pneumatic driven air pump.

[0030] The drawings are only principle sketches and not to scale. Although, the valves 7a, 7b, 9a, 9b are shown as close to the air cushion members 2a, 2b, the distances can be selected such that the valves are closer to the inflation tool 4 than to the air cushion members 2a, 2b. This is a design option that is adjustable to the most suitable configuration.

[0031] In the latter case, a fully automated sequence can optionally be performed with inflation of the first air cushion member 2a as a first sequential step and deflation of the first air cushion member 2a as a second sequential step; then, as a third sequential step, inflation of

the second air cushion member 2b while the first air cushion member 2a is deflated, and deflation of the second air cushion as a fourth sequential step. For example, such sequence can be used for lifting one side of an element first and then another side of an element.

[0032] Alternatively, as an example, the first air cushion member 2a is inflated first, then the second air cushion member 2b, after which only the first air cushion member 2a or the second air cushion member 2b is deflated, followed by a final deflation of the remaining inflated air cushion member. Various sequences are possible with such automated arrangement.

[0033] In other embodiments, this sequence is performed without the controller 8 by instead operating the valves 7a, 7b, 9a, 9b manually. Alternatively, the valves 7a and 7b and the inflation tool 4 are connected to the controller 8, but the deflation valves 9a, 9b are operated manually.

[0034] It is pointed out that the controller 8 is fully optional, as in certain embodiments, the start and stop of the common air pump 6, the operation of the first valve 7a and the second valve 7b and the first deflation valve 9a and the second deflation valve 9b are all operated manually.

[0035] In the configuration in FIG. 1a, also flow regulators and/or pressure regulators can be provided on one or both sides of the T-piece connector in order to differentiate the pressure and/or flow, for example maximum pressure and/or flow, for the air cushion member or members.

[0036] FIG. 1b shows the arrangement of FIG. 1a without the valves. In this case, the first air cushion member 2a and the second air cushion member 2b are always inflated simultaneously.

[0037] FIG. 1c illustrated the arrangement where the T-piece 3 is substituted by a cross such that 3 air cushion members 2a, 2b, 2c can be filled simultaneously. FIG. 1d shows a further configuration with 4 air cushion members 2a, 2b, 2c, 2d are connected to a common air pump 6 with hoses via a T-piece 3 and with a cross connection 10. The configurations of FIG. 1c and 1d can be modified with a valve systems that controls the inflation and deflation analogously to the configuration in FIG. 1a.

[0038] FIG. 2a and 2b illustrate alternative embodiments, where the inflation tool 4 is provided with a regulator unit 11 that is hose-connected to the common air pump 6. The regulator unit 11 comprises a valve arrangement for inflation and deflation of each single air cushion 2a, 2b, 2c in isolation, sequentially, or in common, dependent on the selection by the user, for example manually by a corresponding keypad and/or knobs 23 as illustrated in FIG. 2b but equally applicable in FIG. 2a. Alternatively or in addition, the inflation and deflation of the two or three air cushion members 2a, 2b, 2c simultaneously or sequentially is regulated by a controller 8 that controls the regulator unit 11 and the air pump 6.

[0039] In FIG. 2a there is indicated a first regulator 25a and a second regulator on the two hoses for regulation

of air flow or maximum air pressure or both for each of the first and second air cushion members 2a, 2b, respectively. In case that the regulators 25a, 25b are configured for regulating the maximum pressure, the regulator is used to adjust the pressure individually for the first and second air cushion members 2a, 2b. For example, it may be of interest that the first air cushion member 2a is inflated to a higher pressure than the second air cushion member. In case that the regulators 25a, 25b are configured for regulating the maximum flow, the regulator is used to adjust the flow individually for the first and second air cushion members 2a, 2b. In this case, the inflation speed can be regulated individually. It is also possible to use only a single regulator 25a in order only to regulate the first air cushion member 2a relatively to the second air cushion member 2b. In some embodiment, the regulators 25a and 25b are configured to regulate both pressure and flow. Alternatively, the first regulators 25a is of the type for regulation of pressure, and the regulator 25b is of the type to regulate flow. The indication of a regulator 25a or 25b is schematic only, and is to be understood that a number of regulators can be provided in connection with the same air hose 5a or the same air cushion member or group of air cushion members.

[0040] The regulators 25a, 25b are also applicable to the other systems as indicated in FIG. 1 and FIG. 2. In FIG. 2c, there are shown three regulators 25a, 25b, 25c. The first regulator 25a is regulating the pressure for the first group of air cushion members 2a and 2c, and the second regulator is regulating the pressure of the second group of air cushion members 2b, 2d. The third regulator is regulating the flow into the first group of air cushion members 2a, 2c. This illustrates different regulators for different groups of air cushion members.

[0041] Likewise, a three branch system as in FIG. 2b is optionally be provided with various numbers of regulators. The considerations and examples with respect to regulators apply equally well for the other embodiments and examples shown and discussed. The principles of FIG. 2a and FIG. 2b are optionally provided with four, five, six or more air cushion members.

[0042] The controller 8 is optionally programmed with several sequential programs for inflating and deflating the various air cushion members 2a, 2b, 2c in dependence on the sequential programs. Sequences with sequential inflating and deflating as described above in connection with FIG. 1a can be performed by the arrangement in FIG. 2 if reduced to two air cushion members. Likewise inflation and deflation sequences can be performed for more than two air cushion members connected to the regulator unit 11. Alternatively to the two or three air cushion members 2a, 2b, 2c, as illustrated in FIG. 2a and FIG. 2b, some or all of the air cushion members 2a, 2b, 2c are alternatively substituted by air cushion member groups. This principle for two groups with each two air cushion members is illustrated in principle in FIG. 2c. Instead of a first air cushion 2a and a second air cushion 2b as in FIG. 2a, a first group of air cushion members 2a, 2c and

a second group of air cushion members 2b, 2d are provided. In analogy with FIG. 2b, three groups of air cushion members are optionally provided or even more than three groups, for example four, five, six, or more groups.

[0043] Optionally, each of the groups of air cushion members comprises more than two air cushion members. As a further option, one group can have a different number of air cushion members than another group.

[0044] Fig. 3 illustrates an air cushion member 2 for the device 1 according to the invention.

[0045] The air cushion member 2 comprises a folded rectangular piece of a sheet material and has a form as a rectangle. The sheet material is joined along an edge region 13 such that the fold 12 constitutes one edge 13a of the rectangle and the edge region 13 constitutes three other edges 13b, 13c, 13d of the rectangle. The sheet material is easily flexible, but non-stretchable. For example, the sheet material is a plastic sheet, reinforced with fibers, optionally glass, polymer, or carbon fibers. At the fold 12, for example provided prior to the folding, there is provided a foot piece of an outwardly projecting, flexible first hose 5a for connection with the common air pump 6. Optionally, as also illustrated in FIG. 1a, a deflation valve 9a is provided on the first hose 5a in the form of a bleeding valve with an actuator button 14. The bleeding valve 9a is for sake of illustration in the figure drawn as being close to the cushion member 2. However, it is optionally provided at a larger distance to the air cushion member 2, for example close to the inflation tool 4.

[0046] Fig. 4a-4d illustrate air cushion members which are not in accordance with the invention.

[0047] FIG. 4a illustrates an air cushion member 22 similar to the one in FIG. 3 but with a central joint 15, which joins the two opposite layers of sheet material of the air cushion member 22. Such joint 15 is typically made by welding, although gluing is another option. The joint 15 extends from the center of one edge 13b towards the center of the opposite edge 13a but does not extend entirely to the opposite edge 13a, because there must be an air flow connection 16 such that air from the first hose 5a can fill the two partial volumes 17a, 17b in either side of the joint 15.

[0048] FIG. 4b illustrates an air cushion member 22' with three partial volumes 17a, 17b, 17c partially separated by two joints, and FIG. 4c illustrates an air cushion member 22' with four partial volumes 17a, 17b, 17c, 17d partially separated by three joints. FIG. 4d illustrates an air cushion member 22' with four partial volumes 17a, 17b, 17c, 17d, partially separated by a cross joint.

[0049] Such joints limit the deformation such that the air cushion member with joint has a smaller maximum thickness as compared to one of an equal size but without joint. Also, the joints result in a more flat shape when fully inflated.

[0050] FIG. 5 illustrates possible embodiments for the T-piece connector 3, the cross connector 10, a Y-piece connector 3' as alternative to the T-piece connector 3, and a piece of tube 5a. These components are used for

assembling systems according to FIG. 1 and FIG. 2 and are optionally provided in an assembly set that also comprises a plurality of air cushion members 2, 22, 22', 22".

[0051] FIG. 6 illustrates various common air pumps, namely a hand operated balloon 6', a bellows 6", for example foot-operated, or an electrical compressor pump 6"". As an example, three hoses of a hose-connection 5 are connected by quick couplings 24 to a manifold 23 for inflation of three air cushion members or three groups of air cushion. Optionally, the manifold 23 is provided with regulation options, in which case the manifold also comprises regulator unit 11 of the type as indicated in FIG. 2.

[0052] The device according to the invention is suitable for lifting and adjusting a variety of elements, for example frames, doors, windows, walls, furniture, and machines.

[0053] In FIG. 7, a prior art drawing is shown with air cushion members 2, each being connected to its air pumping balloon. A device as described above is suitable for such use, where the two left air cushion members and the two right air cushion members form two groups that are inflated by respective hoses, for example as illustrated in FIG. 2c, where the left group and the right group of air cushion members are inflated differently and adjustable. The two wedges 7 in FIG. 7 can thus be substituted by a system in FIG. 1a, FIG. 1b, or FIG. 2a, depending on whether the window has to be lifted and lowered identically or differentially. As a further alternative, the system in FIG. 2b is provided with six air cushion members that can be inflated, deflated, and regulated individually; such system is suitable for substituting the four air cushion members 2 in FIG. 7 as well as the two wedges 7.

NUMBER LIST

[0054]

- 1 device
- 2 air cushion member
- 2a first air cushion member
- 2b second air cushion member
- 3 T-piece
- 3' Y-piece
- 4 inflation tool
- 5 hose-connection
- 5a first hose
- 5b second hose
- 5c third hose
- 5' further hose to pump
- 6 common air pump
- 6' hand operated balloon
- 6" bellows
- 6"" compressor
- 7a, 7b valve arrangement
- 8 controller
- 9a, 9b deflation valve
- 10 cross connection
- 11 regulator unit
- 12 fold

13 edge region
 13a edge with fold 12
 13b, 13c, 13d edges of air cushion member 2
 14 actuator button
 15 central joint of air cushion member 22
 16 air flow channel in air cushion member 22
 17a, b, c partial volumes
 18 wall opening
 19 wedge
 20 window frame
 21 holes in window frame 20
 22 air cushion member with a single joint
 22' air cushion member with a two joints
 22" air cushion member with a three joints
 23 manifold
 24 quick coupling
 25a, 25b regulator for pressure or flow or both

Claims

1. A device (1) for positioning a door or window relatively to a surface, the device (1) comprising a plurality of inflatable air cushion members (2) of a flexible but non-stretchable air tight sheet material in hose-connection (5) with an inflation tool (4); wherein each inflatable air cushion member (2) is formed as a bag unit comprising opposite layers of said sheet material provided face to face and joined along an edge area to form a double layer edge region (13); wherein the bag unit is flat in deflated condition; wherein the air cushion members (2) of the plurality of inflatable air cushion members are separate from each other such that the edge area of a first cushion member (2a) of the plurality of inflatable air cushion members (2) is entirely disjoint from the edge area of a second cushion member (2b) of said a plurality of inflatable air cushion members (2); wherein said first (2a) and second cushion member (2b) are connected through said hose-connection (5) to a common air pump (6) as part of the inflation tool (4), said common air pump (6) being configured for inflation of said first (2a) and second cushion member (2b), **characterized in that** each air cushion member (2) comprises a rectangular piece of a folded sheet material formed as a rectangle with a fold (12), wherein the sheet material is joined to form a double layer only along the edge region (13) and joined such that the fold (12) constitutes one edge (13a) of the rectangle and the joined double layer edge region (13) constitutes three other edges (13b, 13c, 13d) of the rectangle, wherein a foot piece of an outwardly projecting, flexible first hose (5a) is provided at the fold (12) for the hose-connection (5).
2. A device according to claim 1, wherein said device is configured for inflation of said first (2a) and second (2b) cushion member simultaneously by the com-

mon air pump (6).

3. A device according to claim 1, wherein said inflation tool (4) is configured for inflation of said first (2a) and second (2b) cushion member sequentially by the common air pump (6).
4. A device according to claim 3, wherein device (1) is configured for a sequence of inflation by the common air pump (6), the sequence comprising inflating said first cushion member (2a) by the common pump (6) while the second cushion member (2b) is deflated; subsequently inflating said second cushion member (2b) by the common air pump (6).
5. A device according to claim 4, wherein said device (1) is configured for deflating said first cushion member (2a) prior to inflating said second cushion member (2b).
6. A device according to claim 1, wherein the device (1) is configured for a sequence of inflation and deflation of the first cushion member (2a) followed by inflation and deflation of said second cushion member (2b).
7. A device according to claim 1, wherein said inflation tool (4) is configured for selective shift between a first inflation mode and a second inflation mode by the common air pump (6); wherein the first mode is inflation of said first and second cushion member (2a, 2b) simultaneously and the second mode is inflation of said first and second cushion member (2a, 2b) sequentially one after the other.
8. A device according to claim 1, wherein said device (1) comprises a first group of multiple air cushion members (2) and a second group of multiple air cushion members (2), wherein the first and the second group are subgroups of said plurality of inflatable air cushion members; wherein the inflation tool (4) is configured for inflating the two subgroups one after the other.
9. A device according to claim 1, wherein the device (1) comprises a regulator (11) having an air inlet, which is connected to the common pump (6), and a first and a second air outlet, the first air outlet being connected to the first air cushion member (2a) or to a first group of air cushion members and the second outlet being connected to the second air cushion member (2b) or to a second group of air cushion members; wherein the regulator (11) is adjustable to selectively inflate one or the other of the first and second air cushion member (2a, 2b) or group of air cushion members at a time.
10. An assembly kit for a device according to claim 1,

the kit comprising a plurality of air cushion members (2) as defined in claim 1, at least two hoses (5a, 5b), and at least one T-piece connector (3) or cross connector (10) fitting the hoses (5a, 5b) for connecting said air cushion members in hose-connection via said hoses with a common air pump.

11. A method for operating a device for positioning a door or window relatively to a surface, the device (1) comprising a plurality of inflatable air cushion members (2) of a flexible but non-stretchable air tight sheet material in hose-connection (5) with an inflation tool (4); wherein each inflatable air cushion member (2) is formed as a bag unit comprising opposite layers of said sheet material provided face to face and joined along an edge area to form a double layer edge region (13); wherein the bag unit is flat in deflated condition; wherein each air cushion member (2) comprises a rectangular piece of a folded sheet material formed as a rectangle with a fold (12), wherein the sheet material is joined to form a double layer only along the edge region (13) and joined such that the fold (12) constitutes one edge (13a) of the rectangle and the joined double layer edge region (13) constitutes three other edges (13b, 13c, 13d) of the rectangle, wherein a foot piece of an outwardly projecting, flexible first hose (5a) is provided at the fold (12) for the hose-connection (5), wherein the method comprises providing the air cushion members (2) of the plurality of inflatable air cushion members (2) separated from each other such that the edge area of a first cushion member (2a) of the plurality of inflatable air cushion members is entirely disjoint from the edge area of a second cushion member (2b) of said a plurality of inflatable air cushion members (2); connecting said first and second cushion member (2a, 2b) through said hose-connection (5) to a common air pump (6) as part of the inflation tool (4) and inflating said first and second cushion member (2a, 2b).

12. A method according to claim 11, wherein the method comprises inflating the first cushion member (2a) while the second cushion member (2b) is deflated, and then deflating the first cushion member (2a); subsequently inflating the second cushion member (2b) while the first cushion member (2a) is deflated and then deflating the second cushion member (2b) to a state where the first and the second cushion members (2a, 2b) both are deflated.

Patentansprüche

1. Vorrichtung (1) zum Positionieren einer Tür oder eines Fensters relativ zu einer Oberfläche, wobei die Vorrichtung (1) eine Vielzahl von aufblasbaren Luftpolsterelementen (2) aus einem flexiblen, jedoch

nicht dehnbaren luftdichten Bahnmaterial in Schlauchverbindung (5) mit einem Aufblaswerkzeug (4) umfasst; wobei jedes aufblasbare Luftpolsterelement (2) als eine Beuteleinheit ausgebildet ist, die gegenüberliegende Schichten des Bahnmaterials umfasst, die gegenüber voneinander vorgesehen und entlang eines Randbereichs verbunden sind, um eine Doppelschichtrandregion (13) zu bilden; wobei die Beuteleinheit im entleerten Zustand flach ist; wobei die Luftpolsterelemente (2) der Vielzahl von aufblasbaren Luftpolsterelementen voneinander getrennt sind, sodass der Randbereich eines ersten Polsterelements (2a) der Vielzahl von aufblasbaren Luftpolsterelementen (2) von dem Randbereich eines zweiten Polsterelements (2b) der einen Vielzahl von aufblasbaren Luftpolsterelementen (2) vollständig disjunkt ist; wobei das erste (2a) und zweite Polsterelement (2b) durch die Schlauchverbindung (5) mit einer gemeinsamen Luftpumpe (6) als Teil des Aufblaswerkzeugs (4) verbunden sind, wobei die gemeinsame Luftpumpe (6) zum Aufblasen des ersten (2a) und zweiten Polsterelements (2b) konfiguriert ist, **dadurch gekennzeichnet, dass** jedes Luftpolsterelement (2) ein rechteckiges Stück eines gefalteten Bahnmaterials umfasst, das als ein Rechteck mit einem Falz (12) ausgebildet ist, wobei das Bahnmaterial verbunden ist, um eine Doppelschicht lediglich entlang der Randregion (13) zu bilden und so verbunden ist, dass der Falz (12) einen Rand (13a) des Rechtecks bildet und die verbundene Doppelschichtrandregion (13) drei andere Ränder (13b, 13c, 13d) des Rechtecks bildet, wobei ein Fußstück eines nach außen hervorstehenden, flexiblen ersten Schlauchs (5a) an dem Falz (12) für die Schlauchverbindung (5) vorgesehen ist.

2. Vorrichtung nach Anspruch 1, wobei die Vorrichtung zum gleichzeitigen Aufblasen des ersten (2a) und zweiten (2b) Polsterelements durch die gemeinsame Luftpumpe (6) konfiguriert ist.
3. Vorrichtung nach Anspruch 1, wobei das Aufblaswerkzeug (4) konfiguriert ist, um das erste (2a) und zweite (2b) Polsterelement der Reihe nach durch die gemeinsame Luftpumpe (6) aufzublasen.
4. Vorrichtung nach Anspruch 3, wobei die Vorrichtung (1) für eine Reihenfolge des Aufblasens durch die gemeinsame Luftpumpe (6) konfiguriert ist, wobei die Reihenfolge das Aufblasen des ersten Polsterelements (2a) durch die gemeinsame Pumpe (6) umfasst, während das zweite Polsterelement (2b) entleert ist; anschließend wird das zweite Polsterelement (2b) durch die gemeinsame Luftpumpe (6) aufgeblasen.
5. Vorrichtung nach Anspruch 4, wobei die Vorrichtung (1) konfiguriert ist, um das erste Polsterelement (2a)

vor dem Aufblasen des zweiten Polsterelements (2b) zu entleeren.

6. Vorrichtung nach Anspruch 1, wobei die Vorrichtung (1) für eine Reihenfolge des Aufblasens und Entleerens des ersten Polsterelements (2a), gefolgt von einem Aufblasen und Entleeren des zweiten Polsterelements (2b), konfiguriert ist. 5
7. Vorrichtung nach Anspruch 1, wobei das Aufblaswerkzeug (4) für eine selektive Verschiebung zwischen einem ersten Aufblasmodus und einem zweiten Aufblasmodus durch die gemeinsame Luftpumpe (6) konfiguriert ist; wobei der erste Modus einem gleichzeitigen Aufblasen des ersten und zweiten Polsterelements (2a, 2b) entspricht und der zweite Modus einem Aufblasen des ersten und zweiten Polsterelements (2a, 2b) der Reihe nach eins nach dem anderen entspricht. 10
8. Vorrichtung nach Anspruch 1, wobei die Vorrichtung (1) eine erste Gruppe von mehreren Luftpolsterelementen (2) und eine zweite Gruppe von mehreren Luftpolsterelementen (2) umfasst, wobei die erste und die zweite Gruppe Untergruppen der Vielzahl von aufblasbaren Luftpolsterelementen sind; wobei das Aufblaswerkzeug (4) konfiguriert ist, um die zwei Untergruppen eine nach der anderen aufzublasen. 15
9. Vorrichtung nach Anspruch 1, wobei die Vorrichtung (1) einen Regler (11) umfasst, der einen Lufteinlass aufweist, der mit der gemeinsamen Pumpe (6) verbunden ist, sowie einen ersten und einen zweiten Luftauslass, wobei der erste Luftauslass mit dem ersten Luftpolsterelement (2a) oder mit einer ersten Gruppe von Luftpolsterelementen verbunden ist und der zweite Auslass mit dem zweiten Luftpolsterelement (2b) oder mit einer zweiten Gruppe von Luftpolsterelementen verbunden ist; wobei der Regler (11) verstellbar ist, um selektiv eines oder das andere des ersten und zweiten Luftpolsterelements (2a, 2b) oder eine Gruppe von Luftpolsterelementen gleichzeitig aufzublasen. 20
10. Bausatz für eine Vorrichtung nach Anspruch 1, wobei der Bausatz eine Vielzahl von Luftpolsterelementen (2) nach Anspruch 1, mindestens zwei Schläuche (5a, 5b) und mindestens einen T-Stück-Verbinder (3) oder Querverbinder (10) umfasst, der zu den Schläuchen (5a, 5b) passt, um die Luftpolsterelemente in Schlauchverbindung über die Schläuche mit einer gemeinsamen Luftpumpe zu verbinden. 25
11. Verfahren zum Betrieb einer Vorrichtung zum Positionieren einer Tür oder eines Fensters relativ zu einer Oberfläche, wobei die Vorrichtung (1) eine Vielzahl von aufblasbaren Luftpolsterelementen (2) aus einem flexiblen, jedoch nicht dehnbaren luftdichten 30

Bahnmaterial in Schlauchverbindung (5) mit einem Aufblaswerkzeug (4) umfasst; wobei jedes aufblasbare Luftpolsterelement (2) als eine Beuteleinheit ausgebildet ist, die gegenüberliegende Schichten des Bahnmaterials umfasst, die gegenüber voneinander vorgesehen und entlang eines Randbereichs verbunden sind, um eine Doppelschichtrandregion (13) zu bilden; wobei die Beuteleinheit im entleerten Zustand flach ist; wobei jedes Luftpolsterelement (2) ein rechteckiges Stück eines gefalteten Bahnmaterials umfasst, das als ein Rechteck mit einem Falz (12) ausgebildet ist, wobei das Bahnmaterial verbunden ist, um eine Doppelschicht lediglich entlang der Randregion (13) zu bilden und so verbunden ist, dass der Falz (12) einen Rand (13a) des Rechtecks bildet und die verbundene Doppelschichtrandregion (13) drei andere Ränder (13b, 13c, 13d) des Rechtecks bildet, wobei ein Fußstück eines nach außen hervorstehenden, flexiblen ersten Schlauchs (5a) an dem Falz (12) für die Schlauchverbindung (5) vorgesehen ist, wobei das Verfahren das Bereitstellen der Luftpolsterelemente (2) der Vielzahl von aufblasbaren Luftpolsterelementen (2) getrennt voneinander umfasst, sodass der Randbereich eines ersten Polsterelements (2a) der Vielzahl von aufblasbaren Luftpolsterelementen von dem Randbereich eines zweiten Polsterelements (2b) der einen Vielzahl von aufblasbaren Luftpolsterelementen (2) vollständig disjunkt ist; wobei das erste und zweite Polsterelement (2a, 2b) durch die Schlauchverbindung (5) mit einer gemeinsamen Luftpumpe (6) als Teil des Aufblaswerkzeugs (4) verbunden sind und das erste und zweite Polsterelement (2a, 2b) aufgeblasen werden. 35

12. Verfahren nach Anspruch 11, wobei das Verfahren das Aufblasen des ersten Polsterelements (2a) umfasst, während das zweite Polsterelement (2b) entleert ist und dann das erste Polsterelement (2a) entleert wird; anschließend Aufblasen des zweiten Polsterelements (2b) während das erste Polsterelement (2a) entleert ist und dann Entleeren des zweiten Polsterelements (2b) zu einem Zustand, in dem das erste und das zweite Polsterelement (2a, 2b) beide entleert sind. 40

Revendications

1. Dispositif (1) permettant de positionner une porte ou une fenêtre par rapport à une surface, le dispositif (1) comprenant une pluralité d'éléments de coussin d'air gonflables (2) constitués d'un matériau en feuille étanche à l'air souple mais non étirable en liaison par tuyau (5) avec un outil de gonflage (4) ; dans lequel chaque élément de coussin d'air gonflable (2) a la forme d'une unité de sac comprenant des couches opposées dudit matériau en feuille prévues face à face et attachées le long d'une zone de bord 45

- pour former une région de bord à double couche (13) ; dans lequel l'unité de sac est plate à l'état dégonflé ; dans lequel les éléments de coussin d'air (2) parmi la pluralité d'éléments de coussin d'air gonflables sont séparés les uns des autres de sorte que la zone de bord d'un premier élément de coussin (2a) parmi la pluralité d'éléments de coussin d'air gonflables (2) est entièrement détachée de la zone de bord d'un second élément de coussin (2b) parmi ladite pluralité d'éléments de coussin d'air gonflables (2) ; dans lequel lesdits premier (2a) et second éléments de coussin (2b) sont reliés par ladite liaison par tuyau (5) à une pompe à air commune (6) faisant partie de l'outil de gonflage (4), ladite pompe à air commune (6) étant conçue pour gonfler lesdits premier (2a) et second éléments de coussin (2b), **caractérisé en ce que** chaque élément de coussin d'air (2) comprend une pièce rectangulaire constituée d'un matériau en feuille plié en forme de rectangle avec un pli (12), dans lequel le matériau en feuille est attaché pour former une double couche le long de la région de bord (13) et attaché de sorte que le pli (12) constitue un bord (13a) du rectangle et que la région de bord à double couche (13) attachée constitue trois autres bords (13b, 13c, 13d) du rectangle, dans lequel une pièce de pied d'un premier tuyau (5a) souple faisant saillie vers l'extérieur est prévue au niveau du pli (12) pour la liaison par tuyau (5).
2. Dispositif selon la revendication 1, dans lequel ledit dispositif est conçu pour gonfler lesdits premier (2a) et second (2b) éléments de coussin simultanément au moyen de la pompe à air commune (6).
 3. Dispositif selon la revendication 1, dans lequel ledit outil de gonflage (4) est conçu pour gonfler lesdits premier (2a) et second (2b) éléments de coussin séquentiellement au moyen de la pompe à air commune (6).
 4. Dispositif selon la revendication 3, dans lequel le dispositif (1) est conçu pour une séquence de gonflage au moyen de la pompe à air commune (6), la séquence comprenant le gonflage dudit premier élément de coussin (2a) au moyen de la pompe commune (6) tandis que le second élément de coussin (2b) est dégonflé ; puis le gonflage dudit second élément de coussin (2b) au moyen de la pompe à air commune (6).
 5. Dispositif selon la revendication 4, dans lequel ledit dispositif (1) est conçu pour dégonfler ledit premier élément de coussin (2a) avant de gonfler ledit second élément de coussin (2b) .
 6. Dispositif selon la revendication 1, dans lequel le dispositif (1) est conçu pour une séquence de gonflage et de dégonflage du premier élément de coussin (2a) suivie du gonflage et du dégonflage dudit second élément de coussin (2b).
 7. Dispositif selon la revendication 1, dans lequel ledit outil de gonflage (4) est conçu pour le changement sélectif entre un premier mode de gonflage et un second mode de gonflage au moyen de la pompe à air commune (6) ; dans lequel le premier mode est le gonflage simultané desdits premier et second éléments de coussin (2a, 2b) et le second mode est le gonflage séquentiel desdits premier et second éléments de coussin (2a, 2b) l'un après l'autre.
 8. Dispositif selon la revendication 1, dans lequel ledit dispositif (1) comprend un premier groupe d'éléments de coussin d'air multiples (2) et un second groupe d'éléments de coussin d'air multiples (2), dans lequel les premier et second groupes sont des sous-groupes de ladite pluralité d'éléments de coussin d'air gonflables ; dans lequel l'outil de gonflage (4) est conçu pour gonfler les deux sous-groupes l'un après l'autre.
 9. Dispositif selon la revendication 1, dans lequel le dispositif (1) comprend un régulateur (11) ayant une entrée d'air, qui est reliée à la pompe commune (6), et une première et une seconde sorties d'air, la première sortie d'air étant reliée au premier élément de coussin d'air (2a) ou à un premier groupe d'éléments de coussin d'air et la seconde sortie étant reliée au second élément de coussin d'air (2b) ou à un second groupe d'éléments de coussin d'air ; dans lequel le régulateur (11) peut être réglé pour gonfler sélectivement l'un ou l'autre des premier et second éléments de coussin d'air (2a, 2b) ou un groupe d'éléments de coussin d'air simultanément.
 10. Kit de montage pour un dispositif selon la revendication 1, le kit comprenant une pluralité d'éléments de coussin d'air (2) selon la revendication 1, au moins deux tuyaux (5a, 5b), et au moins un raccord en T (3) ou un raccord en croix (10) emmanchant les tuyaux (5a, 5b) pour relier lesdits éléments de coussin d'air en liaison par tuyau par l'intermédiaire desdits tuyaux avec une pompe à air commune.
 11. Procédé de fonctionnement d'un dispositif permettant de positionner une porte ou une fenêtre par rapport à une surface, le dispositif (1) comprenant une pluralité d'éléments de coussin d'air gonflables (2) constitués d'un matériau en feuille étanche à l'air souple mais non étirable en liaison par tuyau (5) avec un outil de gonflage (4) ; dans lequel chaque élément de coussin d'air gonflable (2) a la forme d'une unité de sac comprenant des couches opposées dudit matériau en feuille prévues face à face et attachées le long d'une zone de bord pour former une région de

bord à double couche (13) ; dans lequel l'unité de sac est plate à l'état dégonflé ; dans lequel chaque élément de coussin d'air (2) comprend une pièce rectangulaire d'un matériau en feuille plié en forme de rectangle avec un pli (12), dans lequel le matériau en feuille est attaché pour former une double couche le long de la région de bord (13) et attaché de sorte que le pli (12) constitue un bord (13a) du rectangle et que la région de bord à double couche (13) attachée constitue trois autres bords (13b, 13c, 13d) du rectangle, dans lequel une pièce de pied d'un premier tuyau (5a) souple faisant saillie vers l'extérieur est prévue au niveau du pli (12) pour la liaison par tuyau (5), le procédé comprenant la fourniture des éléments de coussin d'air (2) parmi la pluralité d'éléments de coussin d'air gonflables (2) séparés les uns des autres de sorte que la zone de bord d'un premier élément de coussin (2a) parmi la pluralité d'éléments de coussin d'air gonflables est entièrement détachée de la zone de bord d'un second élément de coussin (2b) parmi ladite pluralité d'éléments de coussin d'air gonflables (2) ; la liaison desdits premier et second éléments de coussin (2a, 2b) par l'intermédiaire de ladite liaison par tuyau (5) à une pompe à air commune (6) faisant partie de l'outil de gonflage (4) et le gonflage desdits premier et second éléments de coussin (2a, 2b) .

12. Procédé selon la revendication 11, dans lequel le procédé comprend le gonflage du premier élément de coussin (2a) tandis que le second élément de coussin (2b) est dégonflé, puis le dégonflage du premier élément de coussin (2a) ; puis le gonflage du second élément de coussin (2b) tandis que le premier élément de coussin (2a) est dégonflé puis le dégonflage du second élément de coussin (2b) dans un état où les premier et second éléments de coussin (2a, 2b) sont tous les deux dégonflés.

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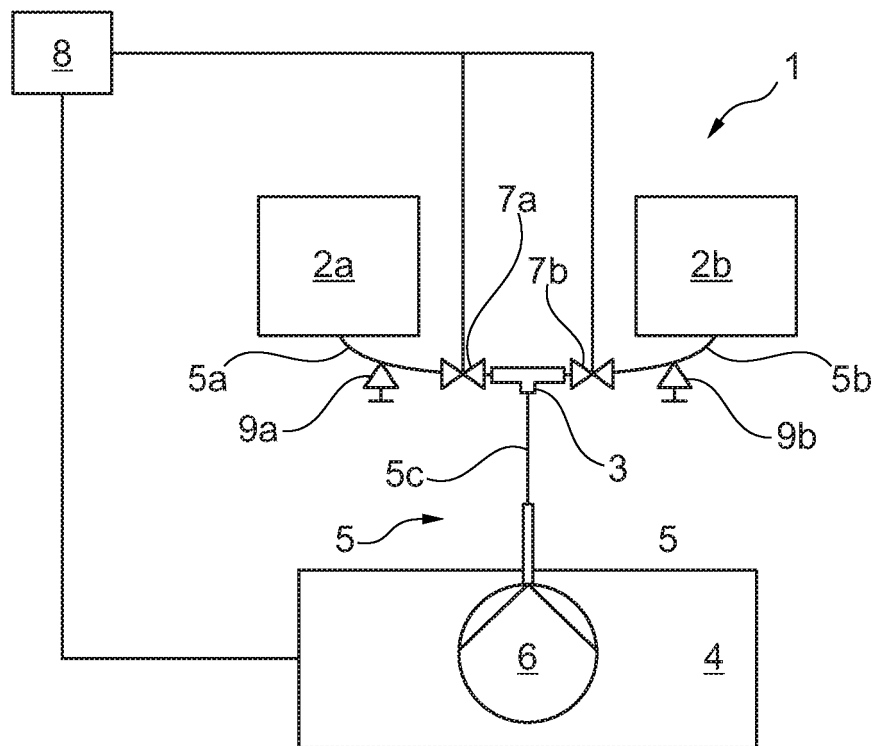


Fig. 1a

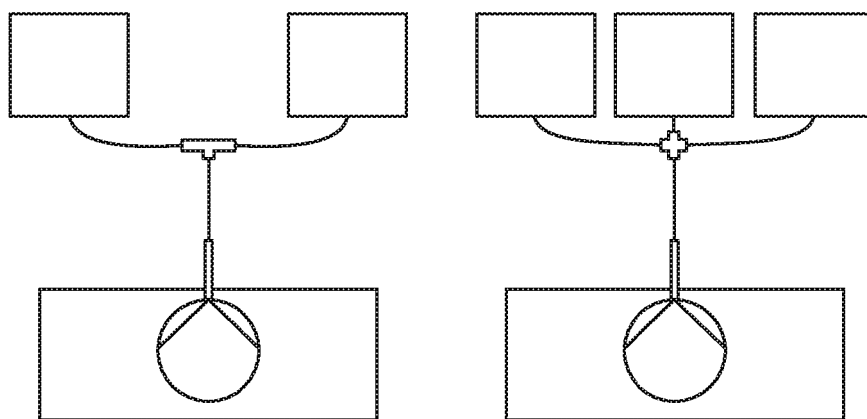


Fig. 1b

Fig. 1c

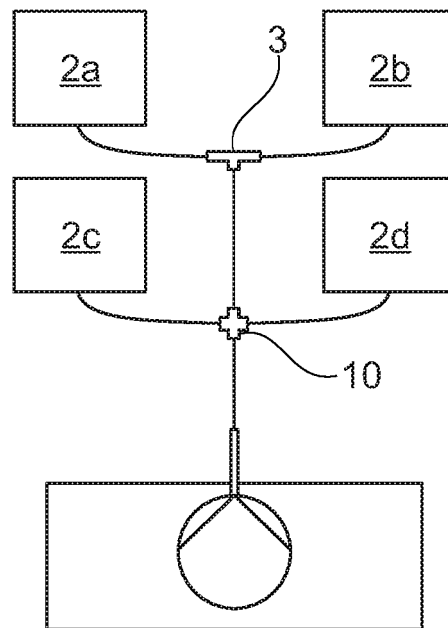


Fig. 1d

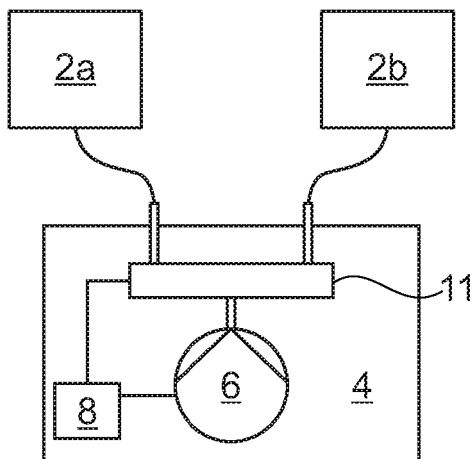


Fig. 2a

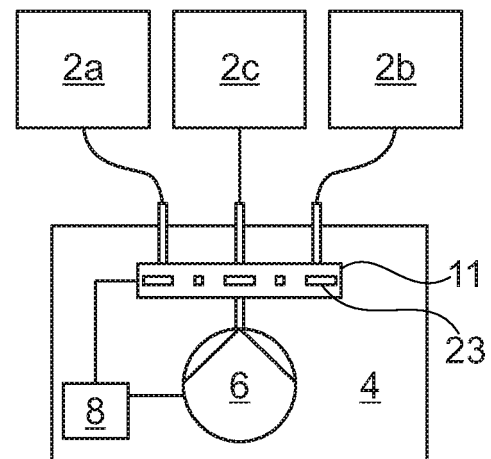


Fig. 2b

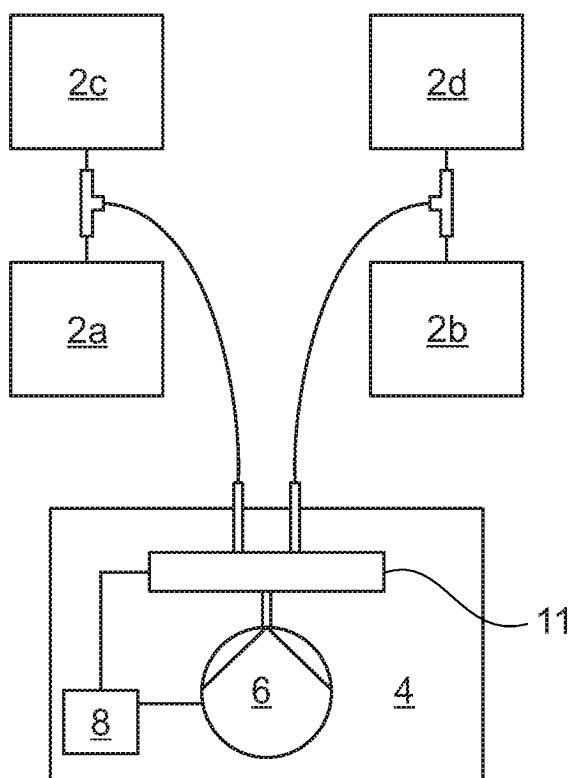


Fig. 2c

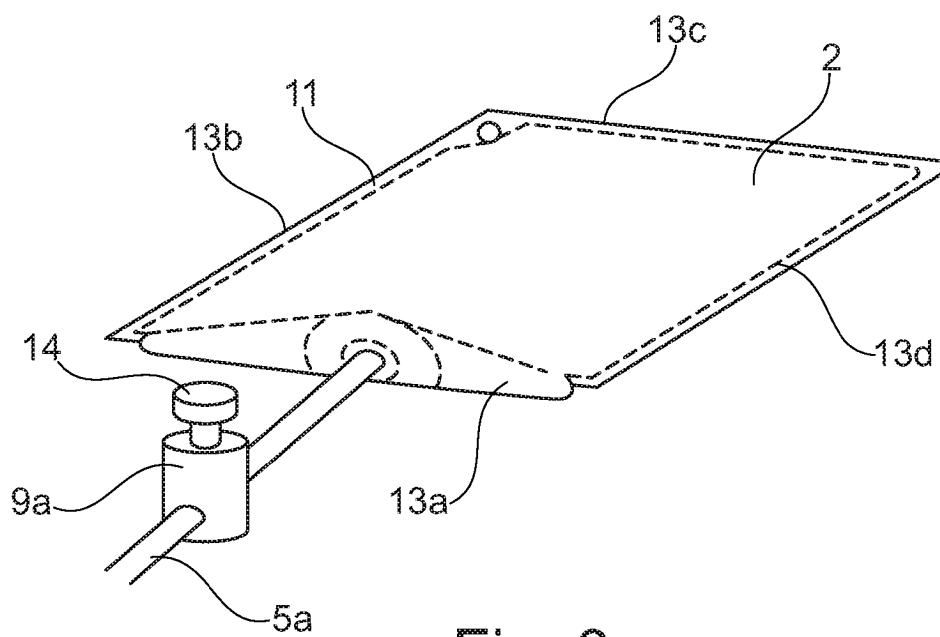


Fig. 3

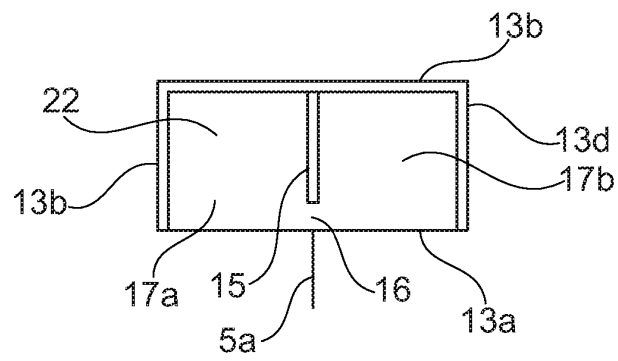


Fig. 4a

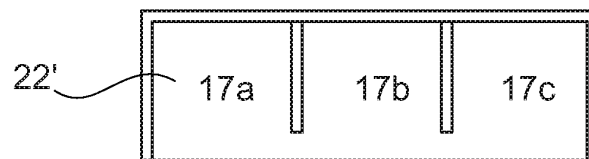


Fig. 4b

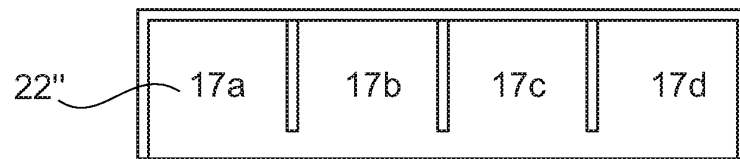


Fig. 4c

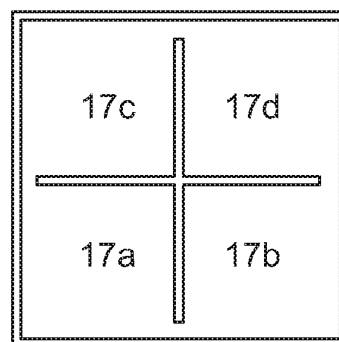


Fig. 4d

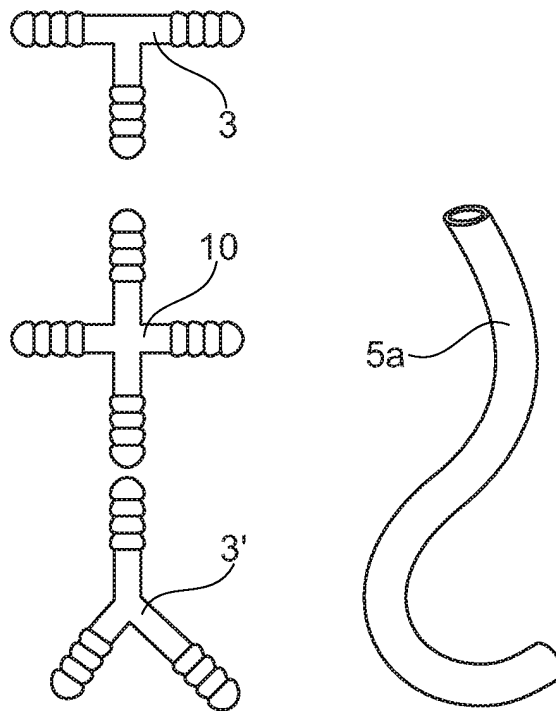


Fig. 5

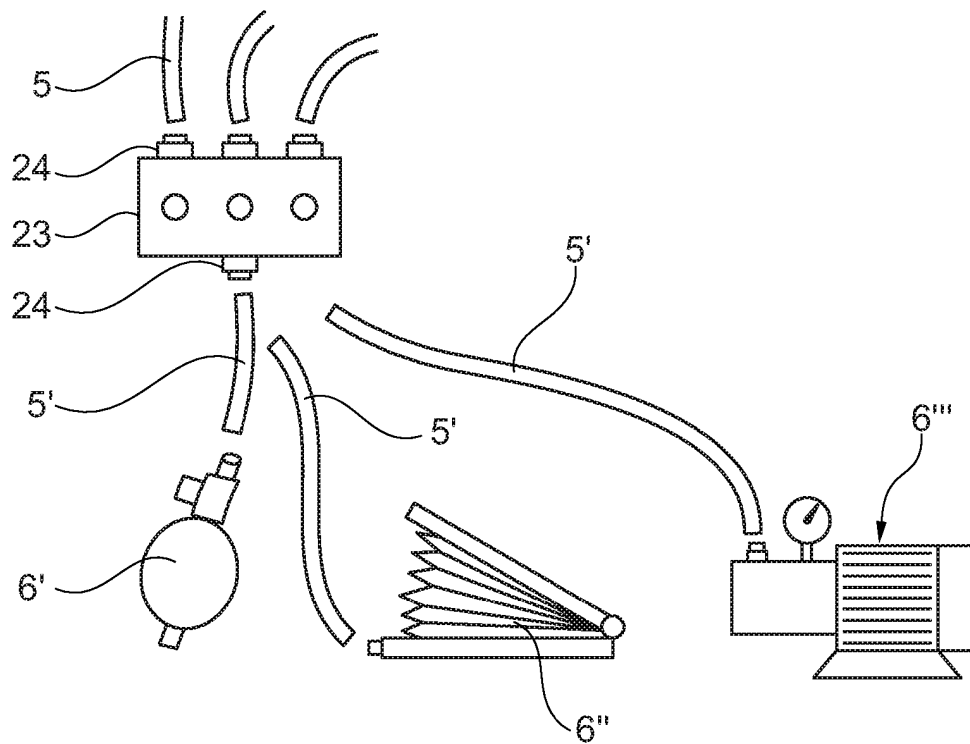


Fig. 6

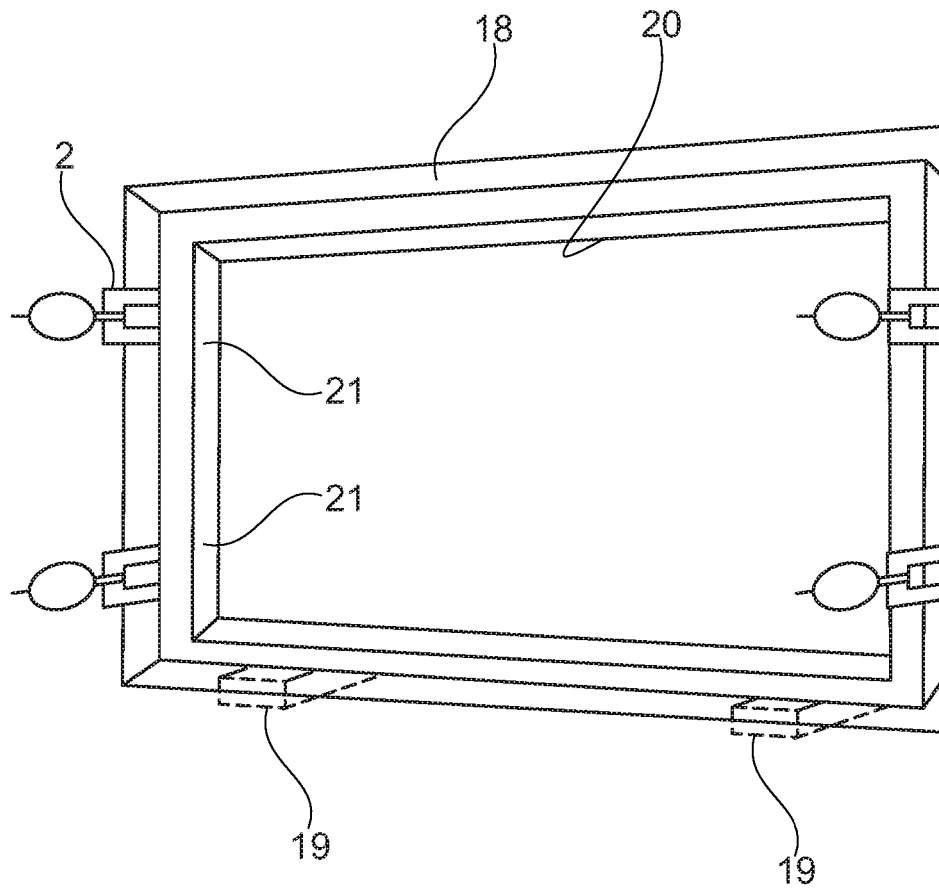


Fig. 7
(PRIOR ART)

REFERENCES CITED IN THE DESCRIPTION

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