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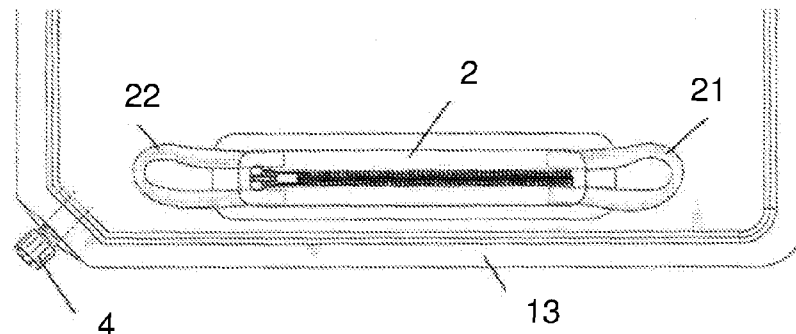
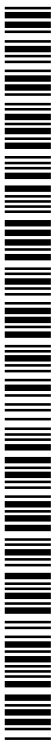


Figure 2

(57) Abstract: A mat system and self-inflating mats are disclosed. The self inflating mat may comprise an upper surface layer (11); a bottom surface layer (12); a filler, wherein the upper surface and the bottom surface layer form an outer surface (13) of the mat and are waterproof and airtight to form a sealed inner space including the filler. An airtight zipper (2) may allow air to flow into or out of the sealed inner space. Alternatively, a screw clamping valve matched with an opening of the sealed inner space to allow air to flow into or out of the sealed inner space. The mat may be connected with a roller-up tube for rolling up the mat, and multiple mats may be joined using a double-C roll bar.



## SELF INFLATING MAT SYSTEM

## TECHNICAL FIELD

[0001] The present invention relates to self-inflating mats.

## BACKGROUND ART

[0002] Self-inflating mats (also referred to as “airbeds”) are widely used in outdoor activities, such as camping and the like, due to their portability and compact storage. Self-inflating mats of the prior art generally comprise an upper surface layer, a bottom surface layer and the foam core between the two layers. The foam core can be made of open cell foam, which is similar to a sponge. The two layers are made of polyester or nylon material. Generally, inner surfaces of the layers are coated with PVC(polyvinyl chloride) or TPU(polyurethane) so that the layers can combined with the foam core by hot-pressing or pasting, and so that the outer surface of the mat is waterproof and airtight.

[0003] These mats generally include a valve at one end of mat, for inflating and deflating the sealed inner space of the mat. In the case of a screw-type valve, a screw cap allows air to flow into or out of the mat by screwing down or unscrewing the screw cap. This screw-type valve can also used as an inflating valve if needed. In particular, the user can supply air to the sealed inner space of the mat by blowing (e.g. by mouth) air through the inflating valve, to increase the pressure of the sealed inner space. Once the inflated mat reaches the required pressure, the valve is closed and the inflated mat is available for use. After using the mat, the valve is opened to let out the air to enable the mat to be rolled into a compact state.

[0004] A problem with such mats of the prior art is that the airflow rate of the valve is very low, making it not possible to quickly or efficiently inflate or deflate the mat. As the valves of these mats do not evacuate the air well, they cannot be rolled up to a compact size to put into the stuff bag. In addition, if air is forced out of these mats too quickly, the air pressure inside the mat may become too high, and the layer adhered to the foam core may separate from the foam core, resulting in a bubble in the surface of the inflated mat.

[0005] In addition, it is almost impossible to empty the air from prior art mats by simply rolling them up. Therefore, it is often recommended to roll up a mat two or more times in order to ensure that as much air as possible is removed from the mat.

[0006] Accordingly, there is a need for improved self-inflating mats.

[0007] It will be clearly understood that, if a prior art publication is referred to herein, this reference does not constitute an admission that the publication forms part of the common general knowledge in the art in Australia or in any other country.

#### SUMMARY OF INVENTION

[0008] The present invention is directed to a self inflating mats and mat systems, which may at least partially overcome at least one of the abovementioned disadvantages or provide the consumer with a useful or commercial choice.

[0009] With the foregoing in view, the present invention in one form, resides broadly in an self-inflating mat including:

an upper surface layer;

a bottom surface layer;

a filler, wherein the upper surface layer and the bottom surface layer form an outer surface of the mat and are waterproof and airtight to form a sealed inner space including the filler; and

an airtight zipper, wherein the airtight zipper comprises an opening of the sealed inner space to allow air to flow into or out of the sealed inner space.

[0010] Advantageously, the airtight zipper mat can be inflated and deflated quickly, and can be rolled compactly.

[0011] Preferably, the airtight zipper is set at a first longitudinal end of the mat.

[0012] Preferably, the airtight zipper mat includes a length of roller-up tube connected to the airtight zipper mat along a width of the mat.

[0013] Preferably, the roller-up tube is telescopic.

[0014] Preferably, the roller-up tube is slidably connected to the second end of the mat through a connecting structure.

[0015] Preferably, the connecting structure includes: at least one connecting strap that extends from the second end, and at least one connecting rod that is connected to the strap. The diameter of the connecting rod may be smaller than that of the roller-up tube, and the tube may have a slit.

[0016] Preferably, the opening is between about 50-300mm in length. Preferably, the

opening size is about 100mm in length.

[0017] Preferably, two sides of the airtight zipper valve are respectively equipped with a pull tab.

[0018] Preferably, the inflated mat includes inflating valve or screw-type valve to better adjust the pressure of the mat.

[0019] Preferably, the filler comprises a foam core between the upper surface layer and the bottom surface layer. The upper surface layer and the bottom surface layer may be combined with the foam core respectively.

[0020] Compared with the traditional standard screw valve mats, the embodiments of the present invention enable inflating and deflated times to be reduced significantly. Furthermore, the size of rolled-up mat may be reduced significantly.

[0021] In another form, the invention resides broadly in a mat comprising a monolayer material or multi-layer material, wherein one end of the longitudinal end of the mat is connected with a roller-up tube for rolling up the mat.

[0022] The roller-up tube may be connected to one end of the mat by the connecting structure.

[0023] Preferably, the roller-up tube can be connected to the one end of the mat slidably through the connecting structure. Preferably, the length of the roller-up tube is corresponding to or less than that of the mat.

[0024] Preferably, the roller-up tube is telescopic.

[0025] Preferably, the connecting structure includes: a connecting strap that extends from the mat, as well as a connecting rod that is connected to the strap, the diameter wherein of the rod is small than the roller-up tube and the rod has a slit.

[0026] Preferably, the mat includes a pillow; wherein the pillow is connected to the mat by the roller-up tube. Preferably, the pillow comprises a storage bag and stuffing.

[0027] Preferably, the connecting structure comprises a first and a second connecting structure that extend from the mat, the connecting structures each comprising a connecting strap that extends from the end of the mat as well as a connecting rod connected to the strap, wherein, the diameter of the connecting rod is smaller than that of the roller-up tube, and the roller-up

tube has a slit.

[0028] Preferably, the pillow includes a corresponding attachment structure, comprising a connecting strap that extends from the outer circumferential surface of the pillow, and a connecting rod connected to the connecting strap.

[0029] Preferably, the connecting structure includes first and the second connecting portions that extend respectively from two sides of the end of the mat.

[0030] Preferably, the mat comprises of an upper layer, a bottom layer and a foam core between these two layers, wherein at the one end of the mat with the roller-up tube connected, the foam core is formed in the shape to make it convenient for the roller-up tube to start rolling up. The shape may comprise an upward slope.

[0031] With the help this roller-up tube, the mat can be rolled up into a compact size easily. In addition, the mat can also be connected to a pillow if needed. More conveniently and efficiently, the pillow can be constituted by the storage bag and connected to the mat with the help of the roller-up tube. If the mat is a inflated one, connect it to the roller-up tube can help rolling out the remaining air; the mat rolling-up operation can be completed at one single time.

[0032] In another form, the invention resides broadly in a mat that includes:

an upper surface layer;

a bottom surface layer,

filler, wherein the upper surface layer and the bottom surface layer forming an outer circumference surface of the mat, and are waterproof and airtight to define a sealed inner space including the filler, and

a screw clamping valve matched with an opening of the sealed inner space to allow air to flow into or out of the sealed inner space, the screw clamping valve comprising a base and a clamping piece, and screw structure including at least a screw component, wherein the base is fixed to inflatable mat and is set with through openings, and the clamping piece can cover the base of the through opening and the clamping piece by the screw structure to form a sealing clamping fit.

[0033] Preferably, the screw valve is set in the longitudinal end of the inflatable mat.

[0034] Preferably, the screw valve includes flexible sealing parts for forming a flexible seal with the base.

[0035] Preferably, the base and the through opening are elongated, and the clamping piece and the flexible sealed parts are also elongated.

[0036] Preferably, the screw structure includes the first and the second screw columns that extend up from the base, the first and the second screw columns penetrate the flexible sealed parts and mesh with the first and the second screws that are respectively set in the clamping piece.

[0037] Preferably, the mat includes a mono-directional inflating valve to better adjust the pressure of the mat. Preferably, the mono-directional inflating valve is set on a clamping piece, and lies between the first and the second screw parts, which includes the valve cover, the valve base and the valve bead. There may be an inflating hole on the valve cover.

[0038] Preferably, the size of opening to the sealed inner space is about 50-300mm.

[0039] Preferably, the mat includes the roller-up tube, and the length of the roller-up tube connected to the mat corresponds with the width of the mat.

[0040] Preferably, the roller-up tube can connect slidably to the second end of the inflated mat through a connecting structure. The connecting structure includes: at least one connecting strap that extends from the second end and at least one connecting rod that is connected to the strap. The diameter of the connecting rod is smaller than that of the roller-up tube. The roller-up tube has a slit.

[0041] Preferably, the filler comprises a foam core between the upper surface layer and the bottom layer. The upper surface layer and the bottom surface layer are combined with the foam core respectively.

[0042] Compared with the traditional standard screw valve mats, the utility model of this mat can notably shorten the time to fill the air or outgas, and reduce the size of the rolled-up mat. Additionally, the roller-up tube connected to the mat can help thoroughly extrude the remaining air with one single operation. Extra blow valve can help users to adjust the compact degree of the mat as needed. What's more, the structure of the utility model of the mat is simple and cost effective; it can be made completely of plastic.

[0043] In another form, the invention resides broadly in a mat system, including a self inflating mat, and a coupler, wherein the coupler includes a first portion, for coupling to a connecting portion of the self inflating mat, and a second portion, for coupling to another object.

[0044] The other object may, for example, comprise another self inflating mat, a pillow, a sheet, a blanket, or a sleeping bag.

[0045] The coupler may be elongate. The first portion may comprise a channel that extends along a length of the coupler.

[0046] The first and second portions may be on opposing sides of the coupler.

[0047] The coupler may comprise a roller, for rolling up the mat.

[0048] Any of the features described herein can be combined in any combination with any one or more of the other features described herein within the scope of the invention.

[0049] The reference to any prior art in this specification is not, and should not be taken as an acknowledgement or any form of suggestion that the prior art forms part of the common general knowledge.

#### BRIEF DESCRIPTION OF DRAWINGS

[0050] Various embodiments of the invention will be described with reference to the following drawings, in which:

[0051] Figure 1 is a perspective view of the a self-inflating mat, according to an embodiment of the present invention;

[0052] Figure 2 is a partial enlarged detail of one end of the mat of Figure 1, which displays the airtight zipper;

[0053] Figure 3 is a perspective view of another end of the mat of Figure 1, which displays the roller-up tube;

[0054] Figure 4 displays the connection and detachment of a roller-up tube;

[0055] Figure 5 displays a partial enlarged detail of the connecting structure of the roller-up tube of Figure 4;

[0056] Figure 6 displays another partial enlarged detail of the connecting structure of the roller-up tube of Figure 4;

[0057] Figure 7 is a perspective view of a mat, wherein the size of the roller-up tube is shorter;

[0058] Figure 8 is also a perspective view of the mat of Figure 7, which displays the way that the mat is rolled up;

[0059] Figure 9 is a perspective view of the mat of Figure 7, which is connected to a pillow;

[0060] Figure 10 is a decomposing perspective view of the mat of Figure 7, which displays a connection of the pillow;

[0061] Figure 11 is also a decomposing perspective view of the mat of Figure 7, which displays another connection of the pillow;

[0062] Figure 12 displays the perspective view of the connection of Figure 11 connected to the pillow;

[0063] Figure 13 illustrates a cross sectional view of a mat according to an embodiment of the present invention;

[0064] Figure 14 illustrates a cross sectional view of a mat according to another embodiment of the present invention;

[0065] Figure 15 illustrates a cross sectional view of a mat according to another embodiment of the present invention;

[0066] Figure 16 is a perspective view of a mat with telescopic roller-up tube, wherein the roller-up tube is in the state of elongation;

[0067] Figure 17 is a perspective view of the mat of Figure 16 with telescopic roller-up tube, wherein the roller-up tube is shortened;

[0068] Figure 18 is a perspective view of a self-inflating mat according to an alternative embodiment of the present invention;

[0069] Figure 19 is a partial enlarged detail of one end of the mat of Figure 18, which displays a screw valve.

[0070] Figure 20 is a perspective view of the screw valve;

[0071] Figure 21 is a perspective view of the screw valve;

[0072] Figure 22 is a perspective view of the screw valve looking from the bottom;

[0073] Figure 23 is a sectional view of the screw valve, which displays the closed airtight state of the screw valve;

[0074] Figure 24 is a sectional view of the screw valve, which displays the open air state of the screw valve;

[0075] Figure 25 is a partial view of the screw valve mat, which displays the closed airtight state of the screw valve;

[0076] Figure 26 is a partial view of the screw valve mat, which displays the open air state of the screw valve;

[0077] Figure 27 displays a mat system, according to an embodiment of the present invention; and

[0078] Figure 28 illustrates a cross sectional view of a double-C roller of the mat system of Figure 27.

[0079] Preferred features, embodiments and variations of the invention may be discerned from the following Detailed Description which provides sufficient information for those skilled in the art to perform the invention. The Detailed Description is not to be regarded as limiting the scope of the preceding Summary of the Invention in any way.

## DESCRIPTION OF EMBODIMENTS

[0080] Figure 1 illustrates a mat 1, according to an embodiment of the present invention. The mat includes an upper surface layer 11, a bottom surface layer 12 and the foam core in between (not marked in the drawing). The upper surface layer and the bottom surface layer are combined with the foam core respectively; and the upper surface and the bottom surface layer on the outer circumference surface 13 of the mat is waterproof and airtight, therefore, it limits the sealed inner space.

[0081] Understandably, although the foam core is set as the filler in the preferred embodiment to the mat, any ordinary technical personnel in this field should understand that the infilling of the mat can be such things as feather, wool, cotton or a mixture of them. In some cases, air can also be the infilling.

[0082] In particular, the mat 1 consists of at least one airtight zipper valve 2 and it is matched with the opening of the internal air to allow air to flow into or out of the sealed inner

space. The airtight zipper valve 2 is made of an airtight zipper, similar to the type of zippers that are used in diving devices. The zipper controls the air flow in and out of the mat.

[0083] As is shown in figure 1, the airtight zipper is set at the first longitudinal end of the mat, namely, the head end. Compared with the existing other valves, such as the standard screw type air valve, the airtight zipper valve 2 can be matched with a large opening, therefore, the speed of the air flowing in and out of the mat can be greatly improved. In some embodiments, the length of the opening of the airtight zipper valve 2 is 100 mm, but in other embodiments the size of the opening can be between about 50 and 300 mm.

[0084] It is noted that, when the airtight zipper valve 2 is joined to the inflatable mat, it takes a lot of force to open or close. Therefore, as shown in Figure 2, in the two ends of the airtight zipper valve, there are respectively pull tabs 21, 22. The pull tabs 21, 22 can be binding to the inflatable mat body or inflatable zipper valve body. When opening or closing the zipper, one hand can be used to grab one pull tab, the other hand can be used to pull the zipper, which can prevent the damage of the mat surface caused by excessive force.

[0085] In addition, as is shown in Figure 2, in order to increase the pressure of the inflatable mat, another blowing valve 4 can also be set in the mat to enable the user to manually blow air into the mat to adjust the inner pressure. The blow valve 4 can also be used to replace the standard screw type valve.

[0086] As is shown in figure 3, the length of the roller-up tube connected to the airtight zipper mat corresponds with a width of the mat. The roller-up tube is made of metal or plastic. With the help of roller-up tube 3, it is easier to roll up the inflatable mat 1, and extrude the air out of mat 1 through opened zipper valve. The roller-up tube assists in moving the air through the zipper valve, as the tube enables air to be extruded in substantially the entire width of the inflatable mat, enabling full and even removal of air.

[0087] In addition, the roller-up tube 3 can be made into a telescopic form. Therefore, if the inflatable mat 1 is thin, it can be folded up in the width direction, and then rolled up to obtain a more compact packing size for easy carrying.

[0088] As is shown in figure 4, the roller-up tube 3 can be slidably connected to the second end of the mat 1 through a simple and dependable connecting structure. Figure 5 illustrates the connecting structure. The connecting structure includes, the connecting strap 14 that extends from the second end of the mat 1, as well as the connecting rod 15 connected to the strap. The diameter of the connecting rod is smaller than that of roller-up tube and it is covered in the

roller-up tube 3 when connected. The roller-up tube 3 has a slit, through which the tube can be connected to or detached from, as shown in arrow of figure 4, the second end of the inflatable mat.

[0089] Figure 6 illustrates another connecting structure. In Figure 5, the connecting strap 14 completely covers the connecting rod 14, while in Figure 6 the connecting strap covers only an extending part of connecting rod 15.

[0090] Understandably, the connecting strap 14 and connecting rod 15 can be respectively set only one; or more can be set as needed. For instance, the inflatable mat can be set with two connecting straps and two connecting rod at the end of the mat, in the direction of the width.

[0091] When in use, the airtight zipper valve 2 can be opened, and the air flowing into the air cushion 1 foam core expands rapidly, and the airtight zipper valve 2 is closed after the full expansion. If necessary, the additional valve 4 can further be used adjust the amount of air inside the mat. After using the inflatable mat to roll it up, the airtight zipper valve 2 is opened, so that most of the air in the air cushion is discharged. Then, the mat is rolled up by the roller-up tube 3 from the second end to the first end while extruding it. The remaining air will thus be evacuated from the airtight zipper valve 2 set at the first end, and the mat will be rolled up into a compact size at the same time.

[0092] The applicant has made a comparative test concerning the mat described above of size 188X66X5cm and a prior art mat of the same size incorporating a standard screw valve, and the results are as follows.

[0093]	Prior art mat	Improved Mat	Improvement
Filling Time(s)	33	18	45%
Outgassing Time(s)	26	19	27%
Rolled-up Size(cm)	19	15	21%

[0094] As can be seen from the above results, compared with the traditional mat with standard screw-type valve, this utility model can reduce the air inflating and deflated time significantly, as well as reduce the size of rolled-up mat. In addition, the roller-up tube connected can help to evacuate out the remaining air thoroughly, the mat rolling-up operation can be completed at one single time. The inflating valve added is convenient for the user to adjust the degree of compacting of the mat with different needs and requirements.

[0095] The skilled addressee will readily appreciate that the airtight zipper can be more than

one airtight zipper, and its position can be variable; the connection between the roller-up tube and the mat can also use a similar sticky buckle like Velcro, etc. All of these modifications and substitutions shall fall within the scope of the present invention.

[0096] As is shown in figure 7, the roller-up tube 3 can be stretched out and drawn back as required. The application of it is shown in figure 8, namely, mat 1 can be folded up first when it needs rolling up, which can further reduce the size of the mat 1 rolled up. This is particularly applicable in the case of a thin mat.

[0097] Additionally, as is shown in figure 16 and 17, the roller-up tube 3 can be made into a telescopic one. Therefore, the length of the tube can be adjusted as required. Respectively, fold the mat 1 in the width direction, and shorten the roller-up tube 3 into the accordant length, the size of the mat will be more compact and portable. It should be noted that the folding mat 1 is not limited to the illustrated case, but may be adjusted as needed. For instance, during the night, the roller-up tube is set in the side of the inflated mat; therefore the mat 1 can be easily folded.

[0098] Figures 9 to 12 illustrates the application of the roller-up tube 3 and the mat 1 when connected with the pillow 5.

[0099] As is shown in figure 9, the end of the mat 1 which connects to the roller-up tube 3 can be connected with pillow 5, in order for the user to lie on it more comfortable. More preferably, such stuffing as clothes can form a pillow.

[00100] Figure 10 illustrates a connection to the pillow 5. The connecting structure set in one end the mat 1 includes the first and the second connecting portion that extend respectively from two sides of the end of the mat, namely, it includes two connecting straps 14 that extends from two sides, as well as two connecting rod 15 that are connected to the straps. The pillow 5 is set with corresponding attachment structure, which comprises a connecting strap 54 that extends from the outer circumferential surface of the pillow, as well as a connecting rod 55 connected to the connecting strap. The connecting structure that consists of connecting straps 54 and connecting rod 55 is similar to the structure of mat 1.

[00101] In use, the attachment structure of the pillow 5 is located approximately in the position as the two parts of the mat 1 connecting structure. Then the roller-up tube 3 is slipped over the first connecting part of mat 1, the attachment structure of pillow 5 and then the second connecting part of mat 1, to complete the connection between the mat 1 and the pillow 5.

[00102] Figure 11 illustrates another way to connect the pillow 5. Differently, the attachment

structure of the pillow 5 comprises a first connecting ring 56 and a second connecting ring 57, which are arranged on the outer circumferential surface of the pillow. When in use, as long as the attachment structure is located approximately in the position of the two parts of the connecting structure of mat, the roller-up tube 3 may be slipped over the first connecting part of mat 1, the first connecting ring 56, the second connecting ring 57 of pillow 5, and then the second connecting part of the mat 1, to complete connection between the mat 1 and the pillow 5. The perspective view of figure 9 with pillow connected is shown in figure 12.

[00103] Understandably, apart from the above connecting structure and method, other structures and methods can also be conceived. For example, in the later connecting method (Figure 11), other quantities of connecting rings can be adopted, for example, only use one connecting ring, or more than two connecting rings. Also, it can be considered to make the attachment structure of the pillow 5 similar to the form of the roller-up tube 3 (i.e., a hollow rod with a slit), so that the pillow 5 can be directly connected to the mat 1, and no original roller-up tube 3 is needed.

[00104] Figure 13, 14 and 15 illustrate alternative cross sectional views of the mat with the roller-up tube separately. As shown in these figures, the foam core of the mat 1 as the end with roller-up tube connected is formed in a shape to make it convenient for the roller-up tube 3 to start rolling up (namely, the shape with the upward slope). This is particularly useful when the mat 1 is thick. Figure 13 displays the roller-up end of the mat 1 in triangular form, Figure 14 displays the roller-up end of the mat 1 in trapezoid form, and Figure 15 displays the roller-up end of the mat 1 in t slope form.

[00105] When using the mat, it can be rolled up from one end of the mat 1 by the roller-up tube 3. If the mat is a inflated one, the valve of the other end of the inflated mat can be open, and roll up the mat from one end to the other end while extruding it. So that the remaining air will be evacuated from the other end of the valve, and the mat will be rolled up into a compact size at the same time. The roller-up tube 3 has different size so that it can roll up the folded mat 1 to make it a more compact size.

[00106] In addition, when using the mat 1, it can be connected to the pillow 5. More conveniently and efficiently, the pillow 5 can be constituted by the storage bag and connected to the mat 1 with the help of the roller-up tube 3.

[00107] Figure 18 illustrates a mat 1' according to an alternative embodiment of the present invention. The mat includes an upper surface layer 11, bottom surface layer 12 and the foam

core in between, similar to the mat 1 of Figure 1.

[00108] The inflatable mat 1' includes at least one screw clamping valve 2', which is matched with the opening of the sealed inner space to allow the air to flow into/out the sealed inner space. As shown in Figure 18, the screw clamping valve 2' is set on the first end (also known as the head end) of the inflation cushion along the longitudinal direction. As shown in Figure 19, the screw clamping valve 2' is located on a periphery portion 13 of the inflatable mat.

[00109] Compared with prior art valves (such as the standard screw type air valve), the screw clamping valve 2' can be matched with a large opening, so that the speed and the flow rate of the air inflows/outflows can be greatly improved. In the embodiment, the length of the opening of the screw clamping valve 2' is 100mm, but the opening size can be adjusted as needed, for example, in the range of 50-300mm.

[00110] Figure 22 presents the structure of the screw clamping valve 2'. As shown in the figure, the screw clamping valve 2' comprises a base 21, a clamping piece 22, a flexible sealing piece 23, a first and a second screw components 24, 25 and a one-way inflating valve 26.

[00111] As can be clearly seen from figure 19, the long-and-narrow-shaped base 21 is hermetically fixed to the outer circumference surface 13, namely, sealingly set between the two layers. If required, the base 21 can also be set in other locations, such as setting on the upper surface layer or bottom surface layer, or set to the side position. The base 21 is provided with a long and narrow through through opening 210, and the through through opening 210 defines the opening of the sealed inner space of the inflatable mat. In order to enhance the strength, a reinforced rib can be arranged at the through opening 210. In addition, the first and second stud with upward extension 211, 212 can be set on the base 21. The first and second stud 211, 212 pass through the opening on the flexible sealing piece 23 and the clamping piece 22, respectively mesh with the first and second screw components 24, 25 which are arranged on the clamping piece 22. The clamping piece 22 and the flexible sealing piece 23 are also long and narrow in shape, and they are sized to cover the through opening 210 of the base 21. Through flexible sealing piece 23, clamping piece 22 and a base 21 form a clamping sealing fit (the valve closed, as shown in figures 23 and 25), or with flexible sealing piece 23 and a base 21 together disengage sealing contact (valve open state, as shown in Figure 24 and 26).

[00112] Understandably, the clamping piece 22 and flexible sealing piece 23 shown in the figure are separated, but in practice it is best to connect them into one, for example, by using the method of coated molding to form a whole. If necessary, by directly forming a clamping piece

22 with the soft material, then the flexible sealing piece 23 may be omitted.

[00113] Additionally, a one-way inflating valve 26 of sealing internal space of mat is also set on the position between the first and second screw components 24, 25 of the clamping piece 22, so that the user can blow (e.g. by mouth) into the inflatable mat 1' to adjust the air pressure, so as to further improve of the pressure of sealing the inner space of the inflatable mat, to obtain ideal compaction degree (hardness). The one-way inflating valve 26 comprises a valve cover 261, a valve seat 262 and a valve bead 263.

[00114] As can be clearly seen from figure 20, on the valve cover 261 sets several inflating holes (for example, three). Again as shown in figure 23 and 24, a valve bead 263 is located in the valve seat 262. When the screw clamping valve 2' is closed and the inner space of the inflatable mat is generated, the valve bead 263 is upward and the blow valve is closed (Figure 23); when the screw clamping valve 2 is opened and the pressure of the inner space of the inflation mat is released, the valve bead 263 is downward and the blow valve is opened (Figure 24). In Figure 23, when there is a need to further improve the pressure of the inflation mat, the user can blow with the mouth, this will force the valve bead 263 down, i.e., the one-way inflating valve 26 to open, thus to add air into inflation mat 1 regulate the compaction.

[00115] Understandably, the screw clamping valve 2' combined with the one-way inflating valve 26 mentioned above is the preferred characteristics. In other aspects, the one-way inflating valve can be separately arranged in other positions of the inflatable mat, for example, on a corner of the inflatable mat.

[00116] The above screw clamping valve 2' causes the clamping piece 22 to move toward the base 21 or deviate from the base 21 through the action of the screw engagement, thereby controlling the air inflow / outflow of the inflatable mat, so in this is called "screw clamping valve". It should also be understood that the screw structure formed by the first and second screw components 24, 25, and first and second studs 211, 212 may be changed as needed. For example, the first and second screw components can be provided with male threads, and the first and second studs 212 and 211 can be replaced with a socket with a female screw thread.

[00117] In use, the screw clamping valve 2' is opened, i.e., the first and second screw components 24, 25 are unscrewed, allowing the clamping piece 22 to separate from the base 21 (Figure 23), thus allowing air to flow into the mat 1'. The foam core is expanded rapidly after complete inflation, and the screw clamping valve 2' is closed after the full expansion, i.e., screw the first and second screw components 24, 25, making the close contact of the clamping 22 and

the base 21 (Figure 22). If necessary, the additional blowing valve 26 can further adjust the pressure inside the mat. After using the inflatable mat, and to roll it up, the screw clamping valve 2 is opened, so that most of the air in the air cushion is discharged. And then, the mat is rolled up by the roller-up tube 3 from the second end to the first end while extruding the air. The remaining air will be evacuated from the airtight zipper valve 2' set at the first end, and the mat will be rolled up into a compact size at the same time.

[00118] The applicant has made a comparative test concerning the mat 1' described above of size 188X66X5cm and a prior art mat of the same size incorporating a standard screw valve, and the results are as follows.

[00119]	Prior art mat	Improved Mat	Improvement
Filling Time(s)	33	18	45%
Outgassing Time(s)	26	19	27%
Rolled-up Size(cm)	19	15	21%

[00120] As can be seen from the above results, compared with the traditional mat with standard screw-type valve, the present invention can reduce the air inflating and deflated time significantly, as well as reduce the size of rolled-up mat. In addition, the roller-up tube connected can help to evacuate out the remaining air thoroughly, the mat rolling-up operation can be completed at one single time. The inflating valve added is convenient for the user to adjust the degree of compacting of the mat with different needs and requirements. What's more, the screw clamping valve of the utility model has a simple structure and can be made of plastic, thus has the advantage of low cost.

[00121] Understandably, there can be more than one screw clamping valves and they can also be set in different locations; the number and position of the screw components are variable, e.g., choose one or more than two; the connection between the roller-up tube and the mat can also use a similar sticky buckle like Velcro, etc. All of these modifications and substitutions shall fall within the scope of the present invention.

[00122] According to an alternative embodiment (not illustrated), the base 21 includes two openings 210 separated by an inflating valve, similar to the inflating valve 26. In such case, two clamping pieces 22 and two flexible sealing pieces 23 are used to seal the two openings 210. As such, each opening is individually operable to allow air in or out of the mat, and the valve extends upwards between each of the clamping pieces 22 and each of flexible sealing pieces 23.

[00123] Figure 27 illustrates a mat system 270, according to an embodiment of the present

invention. The mat system 270 includes a plurality of mats 275, each with side connecting portions 280 and a pillow portion 285. The mats 175 may be similar or identical to the mats 1, 1' described above.

[00124] The side connecting portions 280 enable several mats 275 to be releasably joined to form a larger mat (much like a double mattress) using a double-C roll bar 290. Similarly, the pillow portion 285 enables a pillow to be releasably attached to the mat 275 also using a double-C roll bar 290.

[00125] The side connecting portions 280 may, however, be used to couple other objects to the mat. For example, a sleeping bag, a sheet, blanket, or cover, may be coupled to the mat using the side connecting portions 280. As such, the system is modular, enabling a wide variety of components to be interconnected.

[00126] Figure 28 illustrates a cross sectional view of the double-C roll bar 290. The double-C roll bar 290 defines opposing channels, having a c-shaped cross section, in which the side connecting portions 280 and the pillow portions 285 may slidably engage. The side connecting portions 280 and the pillow portions 285 may have a circular cross section, and engage with the double-C roll bar 290 in a similar manner to the connecting rod 15 and the roller-up tube 3 of Figure 6 above.

[00127] According to certain embodiments, the double-C roll bar 290 or the roller 3 incorporates one or more light emitting diodes (LEDs) (not illustrated) and a power source (e.g. batteries). This enables the roller 290, 3 to be used as a light source, for example when reading, or otherwise.

[00128] In the present specification and claims (if any), the word 'comprising' and its derivatives including 'comprises' and 'comprise' include each of the stated integers but does not exclude the inclusion of one or more further integers.

[00129] Reference throughout this specification to 'one embodiment' or 'an embodiment' means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, the appearance of the phrases 'in one embodiment' or 'in an embodiment' in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, the particular features, structures, or characteristics may be combined in any suitable manner in one or more combinations.

[00130] In compliance with the statute, the invention has been described in language more or less specific to structural or methodical features. It is to be understood that the invention is not limited to specific features shown or described since the means herein described comprises preferred forms of putting the invention into effect. The invention is, therefore, claimed in any of its forms or modifications within the proper scope of the appended claims (if any) appropriately interpreted by those skilled in the art.

## CLAIMS

1. An airtight zipper mat including:

an upper surface layer;

a bottom surface layer;

a filler, wherein the upper surface and the bottom surface layer form an outer surface of the mat and are waterproof and airtight to form a sealed inner space including the filler; and

an airtight zipper, wherein the airtight zipper comprises an opening of the sealed inner space to allow air to flow into or out of the sealed inner space.

2. The mat of claim 1, wherein the airtight zipper valve is set on the first end of the mat in the longitudinal direction.

3. The mat of claim 1, including a length of roller-up tube connected to the airtight zipper mat along a width of the mat.

4. The mat of claim 3, wherein the roller-up tube is telescopic.

6. The mat of claim 3, wherein the roller-up tube is slidably connected to a second end of the mat through a connecting structure.

7. The mat of claim 6, wherein the connecting structure includes: at least one connecting strap that extends from the second end as well as at least one connecting rod that is connected to the strap, wherein a diameter of the connecting rod is smaller than that of the roller-up tube, and the tube has a slit.

8. The mat of claim 1, wherein the opening is between about 50-300mm in length.

9. The mat of claim 1, wherein two sides of the airtight zipper valve are respectively equipped with a pull tab.

10. The mat of claim 1, wherein the mat includes an inflating valve or screw-type valve to better adjust the pressure of the mat.

11. The mat of above any one of the preceding claims, wherein the filler comprises a foam core between the upper surface layer and the bottom layer, wherein the upper surface layer and the bottom surface layer are combined with the foam core respectively.

12. A mat comprising of monolayer or multi-layer material wherein a longitudinal end of the mat is connected with a roller-up tube for rolling up the mat, wherein the roller-up tube is

connected to one end of the mat by a connecting structure.

13. The mat of claim 12, wherein the roller-up tube is slidably and detachably connected to the one end of the mat through the connecting structure.
14. The mat of claim 12, wherein a length of roller-up tube is corresponding to or less than a width of the mat.
15. The mat of claim 12, wherein the roller-up tube is telescopic.
16. The mat of claim 12, wherein the connecting structure comprises: a connecting strap that extends from the mat, and a connecting rod that is connected to the strap, wherein, the diameter of the rod is smaller than the roller-up tube and the rod has a slit.
17. The mat of claim 12, further including a pillow, wherein the pillow is connected to one end of the roller-up tube that is connected to the mat.
18. The mat of claim 17, wherein the pillow comprises a storage bag and stuffing.
19. The mat of claim 17, wherein the connecting structure comprises a first and a second connecting structure that extend from the mat, namely, the connecting structures each comprising a connecting strap that extends from the end the mat as well as a connecting rod connected to the strap, wherein, the diameter of the connecting rod is smaller than that of the roller-up tube, and the roller-up tube has a slit, wherein the pillow is set with corresponding attachment structure, comprising a connecting strap that extends from the outer circumferential surface of the pillow, and a connecting rod connected to the connecting strap.
20. The mat of claim 17, wherein the connecting structure includes the first and the second connecting portion that extend respectively from two sides of the end of the mat.
21. The mat of claim 1, comprising an upper layer, a bottom layer and a foam core between these two layers, wherein at the one end of the mat with the roller-up tube connected, the foam core is formed in the shape to make it convenient for the roller-up tube to start rolling up, and includes an upward slope.
22. A self-inflating mat including:
  - an upper surface layer; a bottom surface layer; and filler, wherein the upper surface layer and the bottom surface layer forming an outer circumference surface of the mat, and are waterproof and airtight to define a sealed inner space including the filler, and

a screw clamping valve matched with an opening of the sealed inner space to allow air to flow into or out of the sealed inner space, the screw clamping valve comprising a base and a clamping piece, and screw structure including at least a screw component, wherein the base is fixed to inflatable mat and is set with through openings, and the clamping piece can cover the base of the through opening and the clamping piece by the screw structure to form a sealing clamping fit.

23. The mat of claim 22, wherein the screw valve is set in the longitudinal end of the inflatable mat.
24. The mat of claim 22, wherein the screw valve includes flexible sealing parts for forming a flexible seal with the base.
25. The mat of claim 24, wherein the base and the through opening are elongated, and the clamping piece and the flexible sealed parts are also elongated.
26. The mat of claim 24, wherein the screw structure includes first and the second screw columns that extend up from the base, wherein the first and the second screw columns penetrate the flexible sealed parts and mesh with the first and the second screws that are respectively set in the clamping piece.
27. The mat of claim 22, including a monodirectional inflating valve to adjust the pressure of the mat.
28. The mat of claim 27, wherein the monodirectional inflating valve is set on the clamping piece, is between the first and the second screws, which includes the valve cover, the valve base and the valve bead, and wherein there is a inflating hole on the valve cover, and the valve base is located on the valve base.
29. The mat of claim 22, wherein the size of opening to the sealed inner space is between about 50-300mm.
30. The mat of claim 22, including a roller-up tube connected to the mat.
31. The mat of any one of claims 22 to 30, wherein the filler comprises a foam core between the upper surface layer and the bottom layer, wherein the upper surface layer and the bottom surface layer are combined with the foam core respectively.

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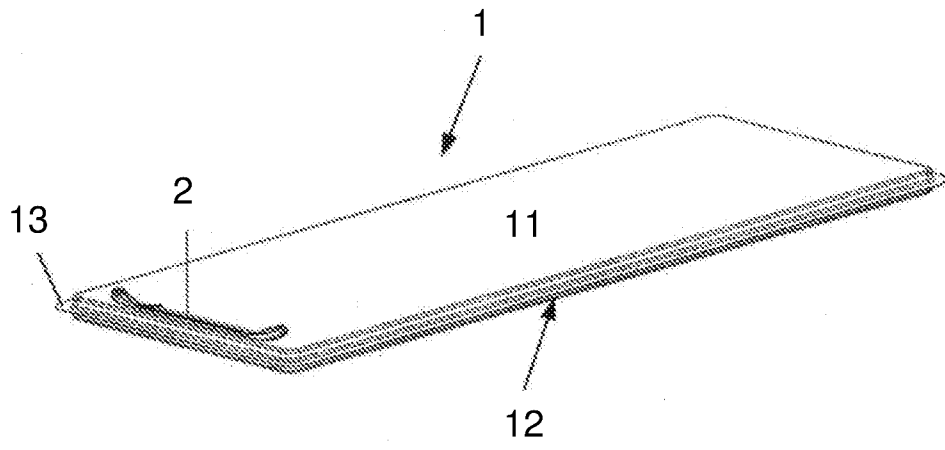


Figure 1

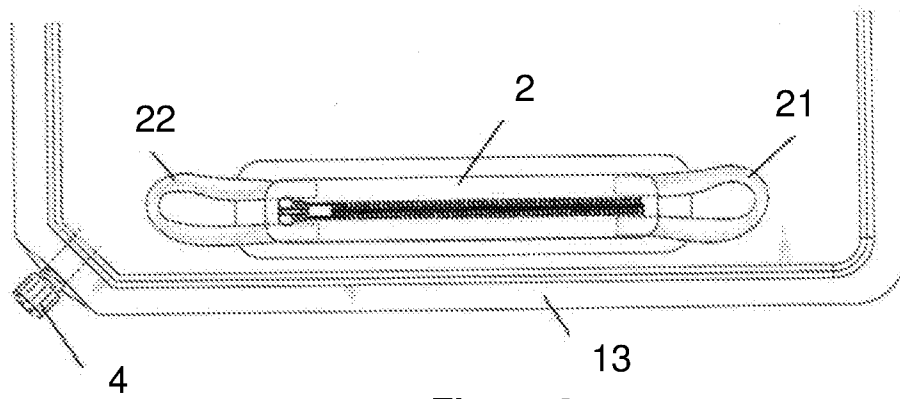


Figure 2

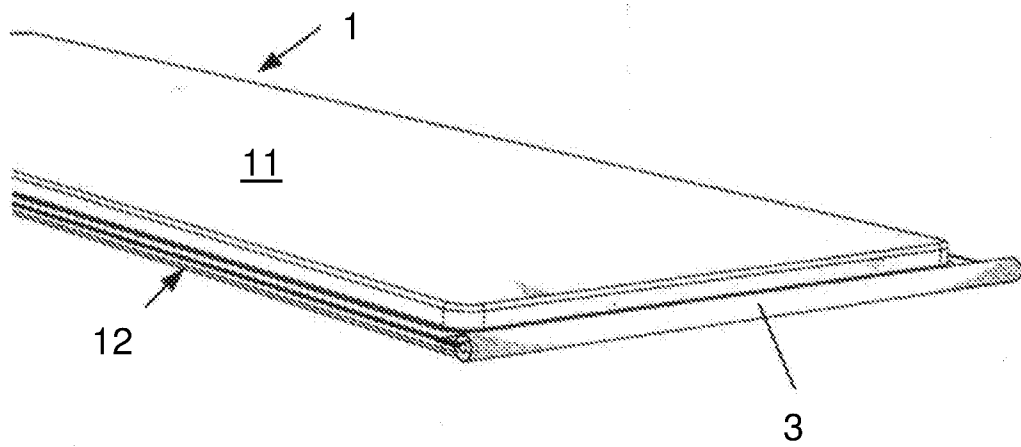


Figure 3

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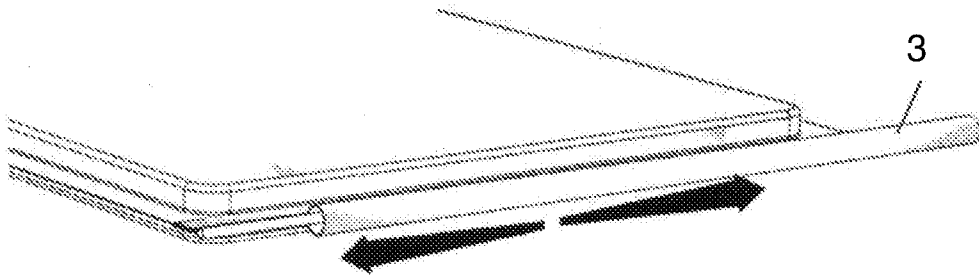


Figure 4

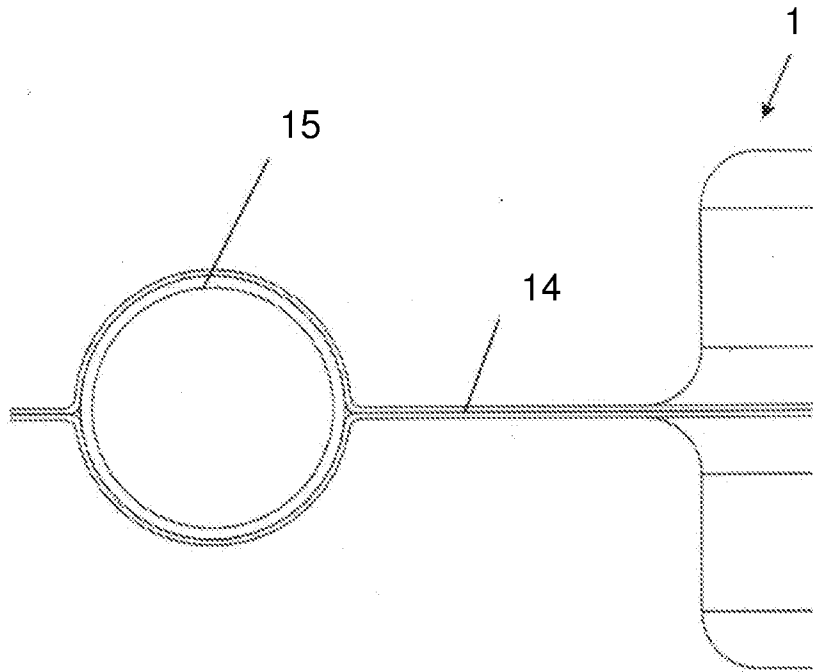


Figure 5

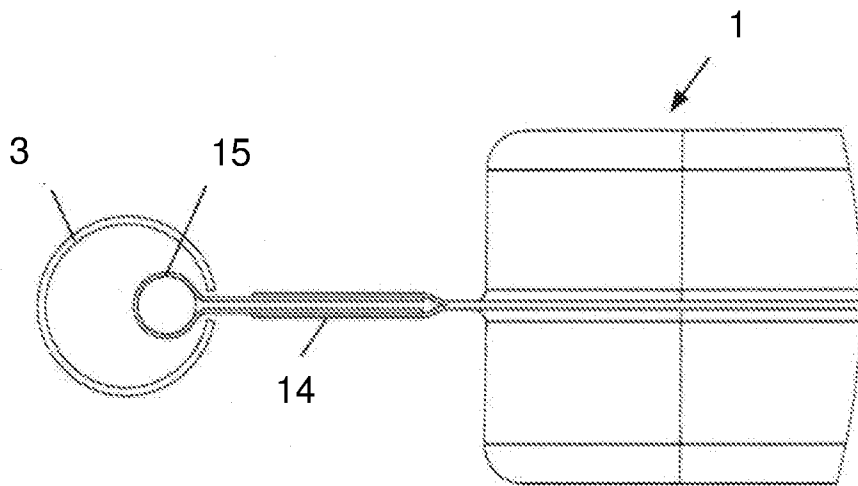


Figure 6

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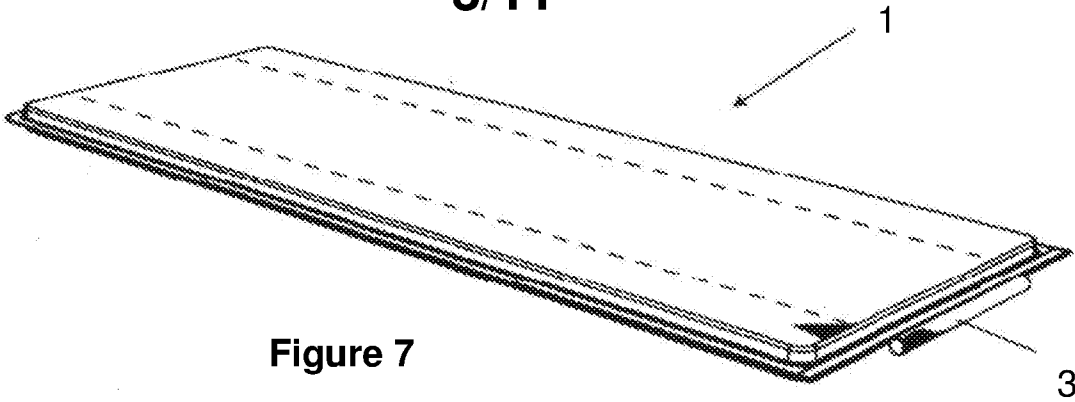


Figure 7

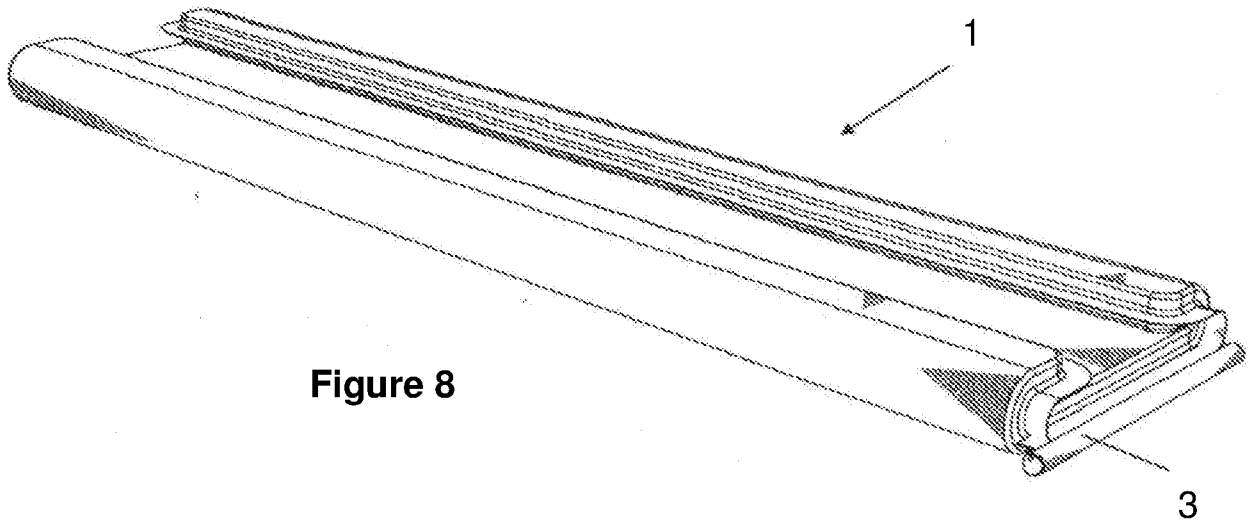


Figure 8

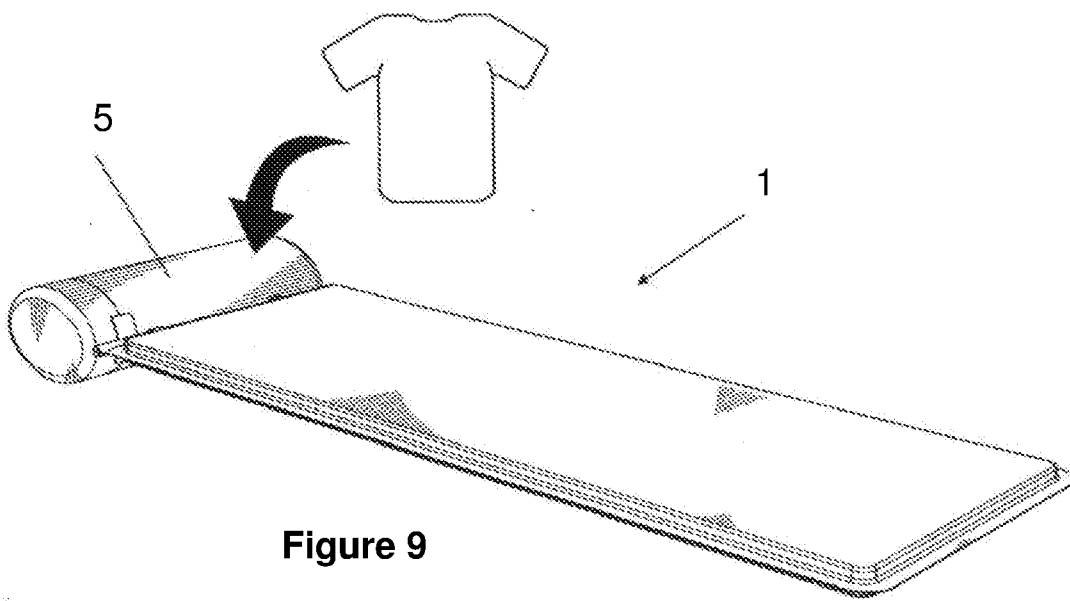


Figure 9

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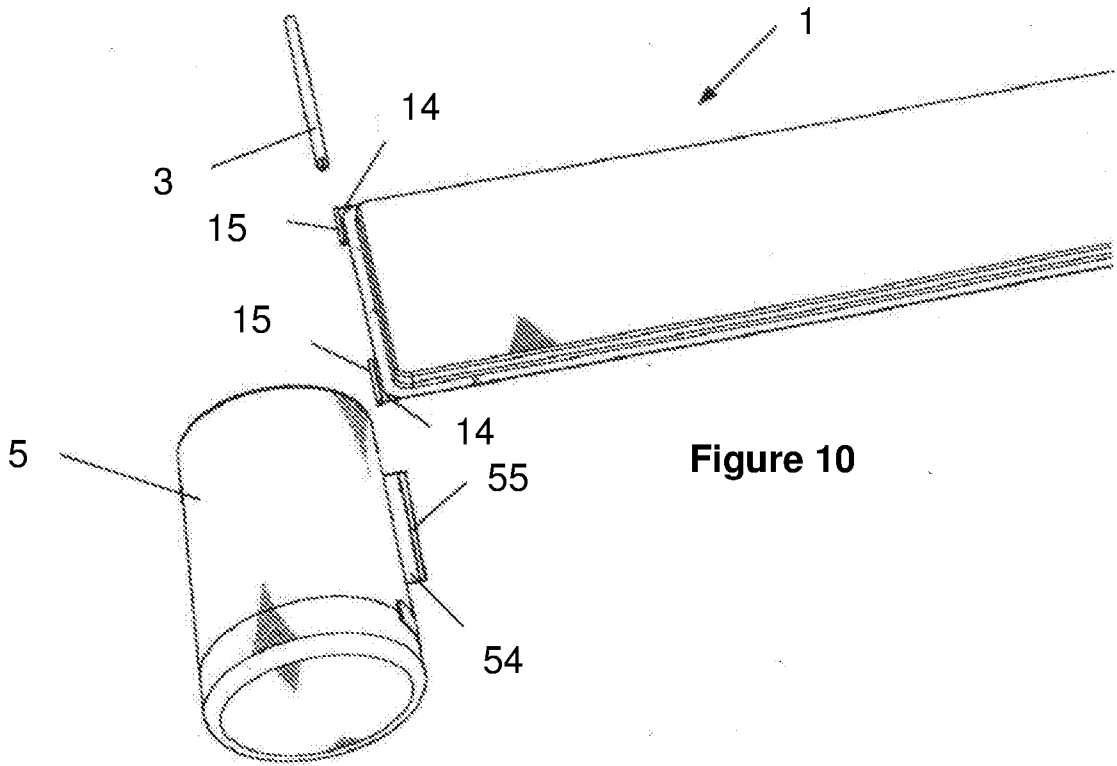


Figure 10

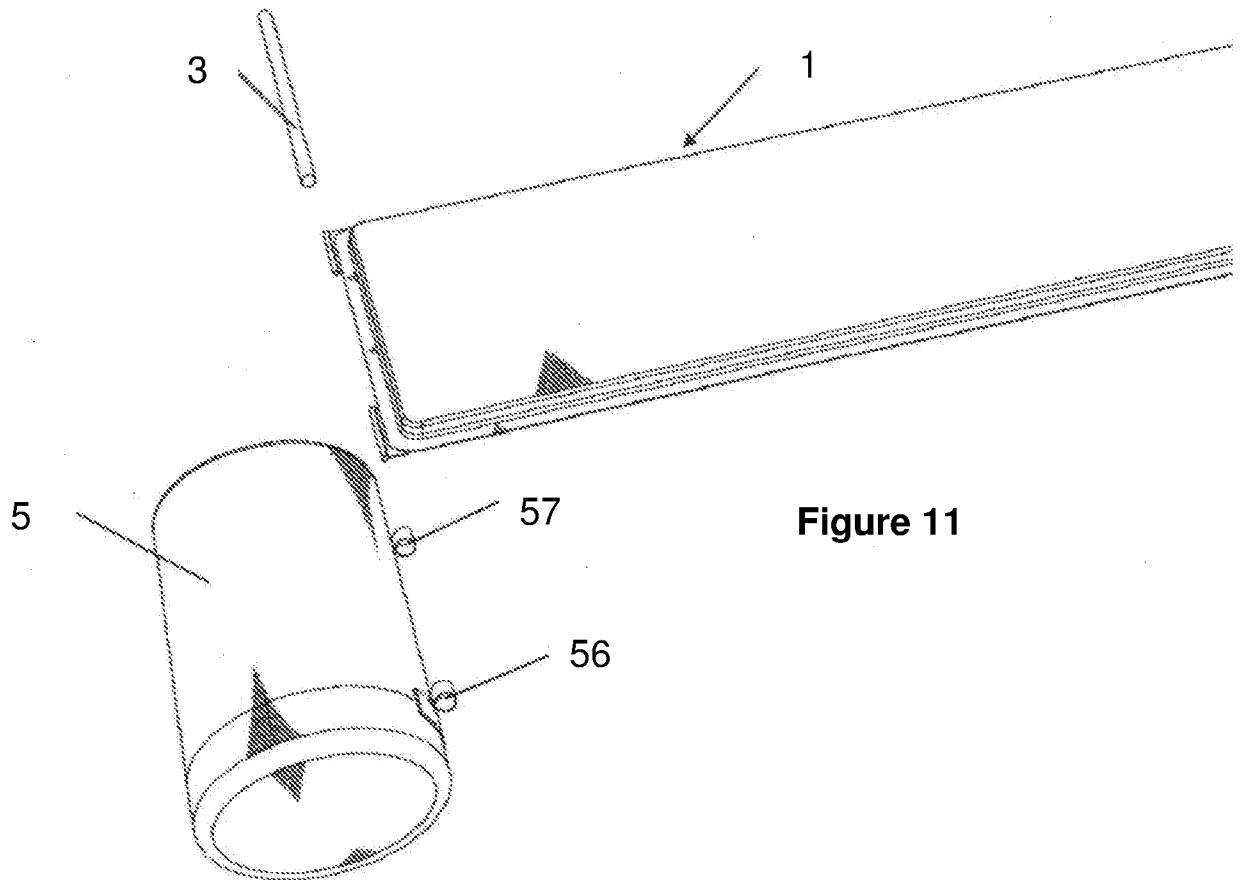


Figure 11

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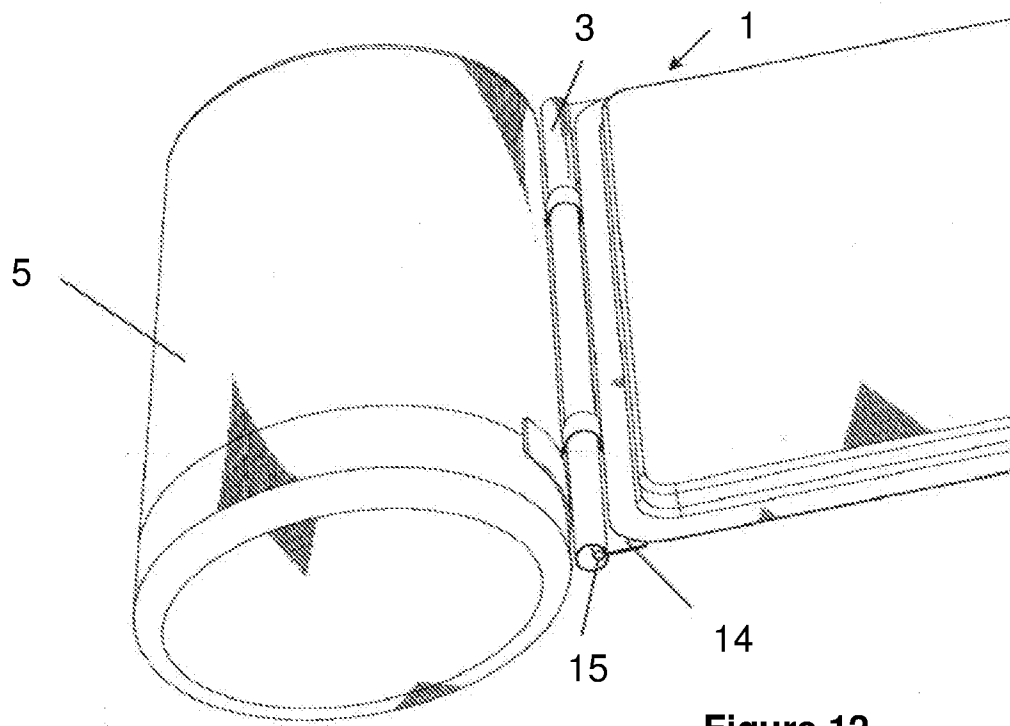


Figure 12

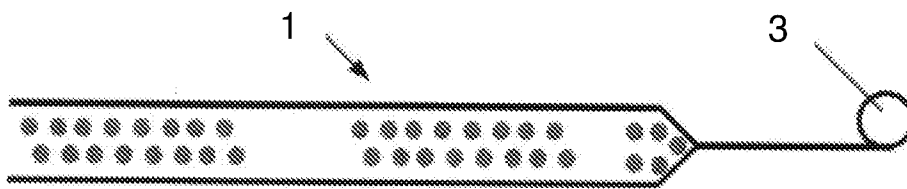


Figure 13

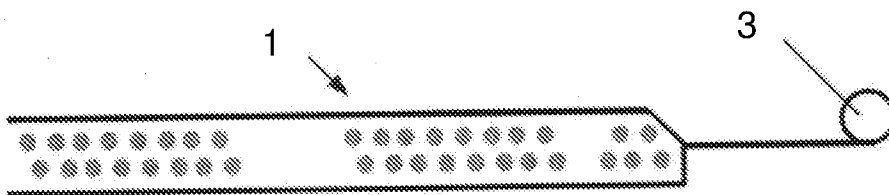


Figure 14

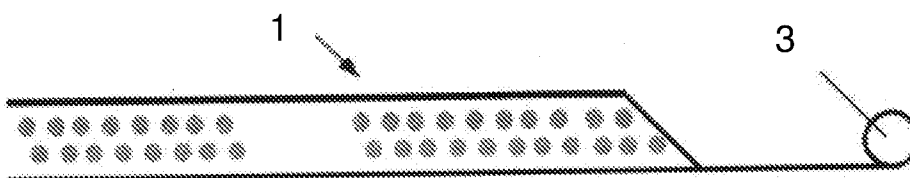


Figure 15

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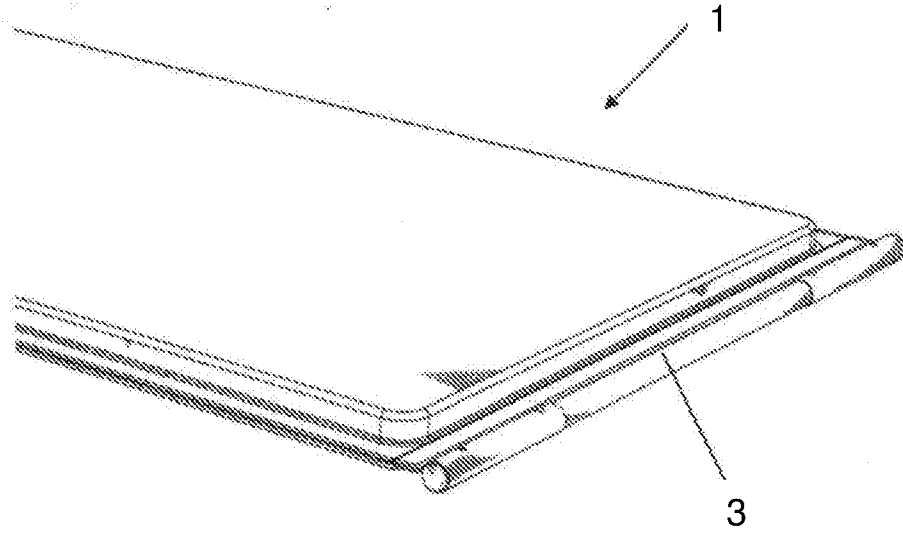


Figure 16

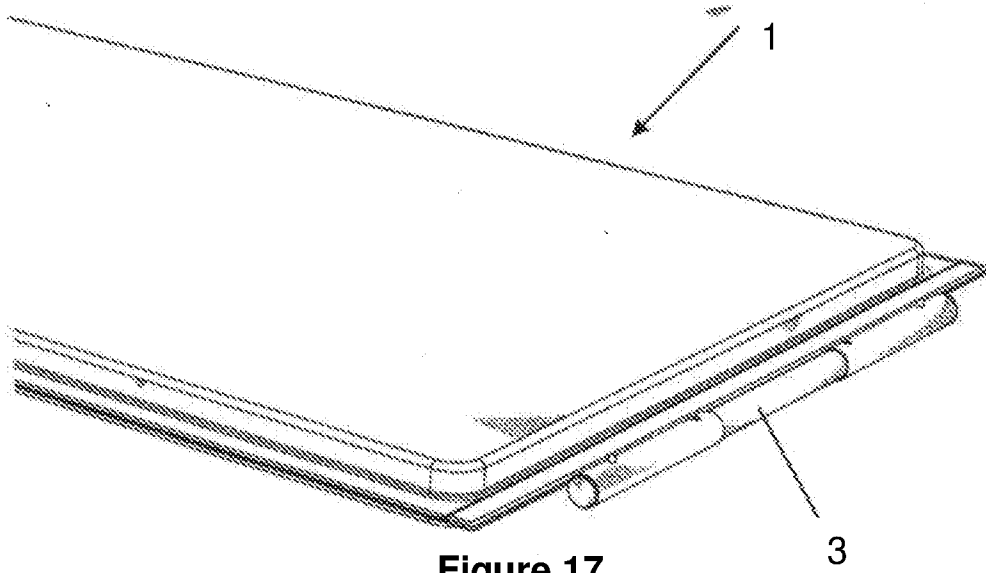


Figure 17

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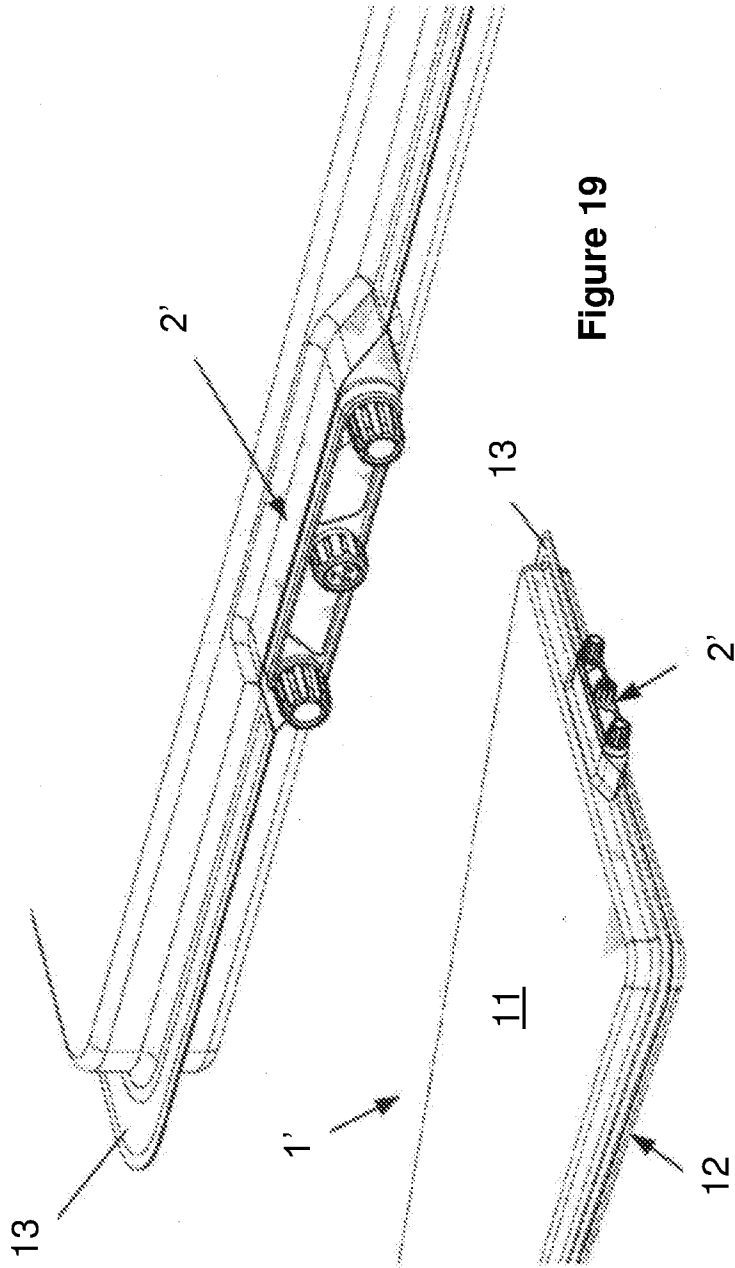


Figure 19

Figure 18

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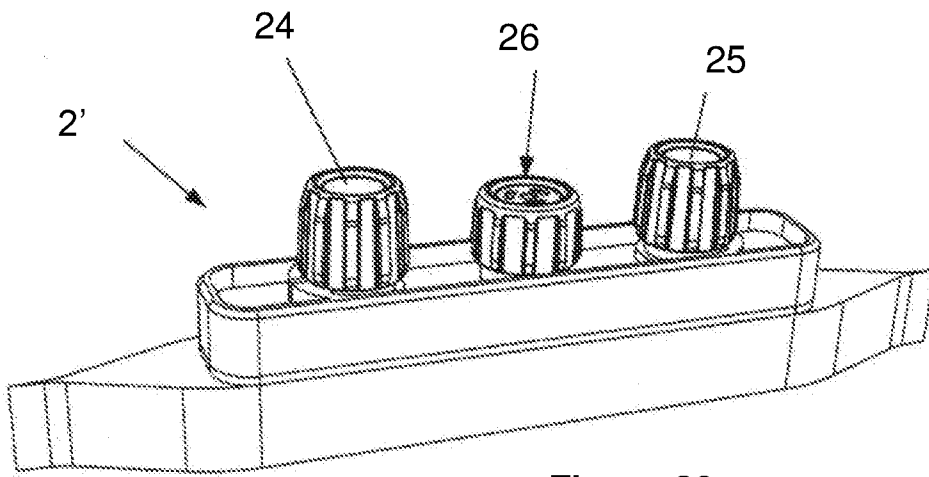


Figure 20

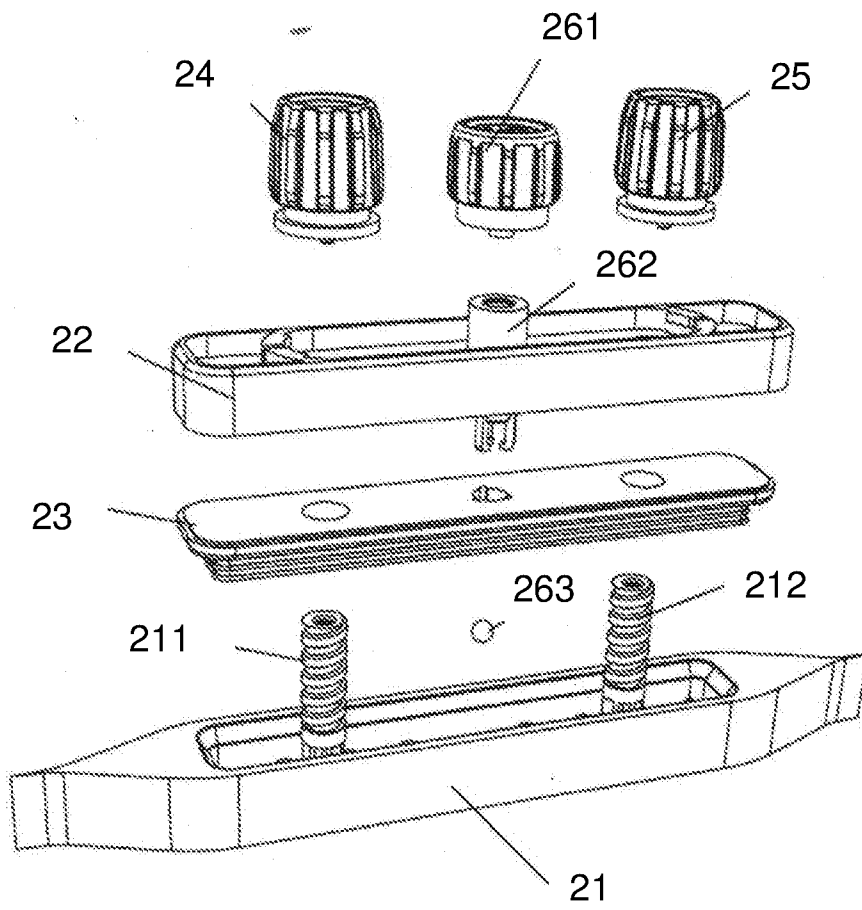


Figure 21

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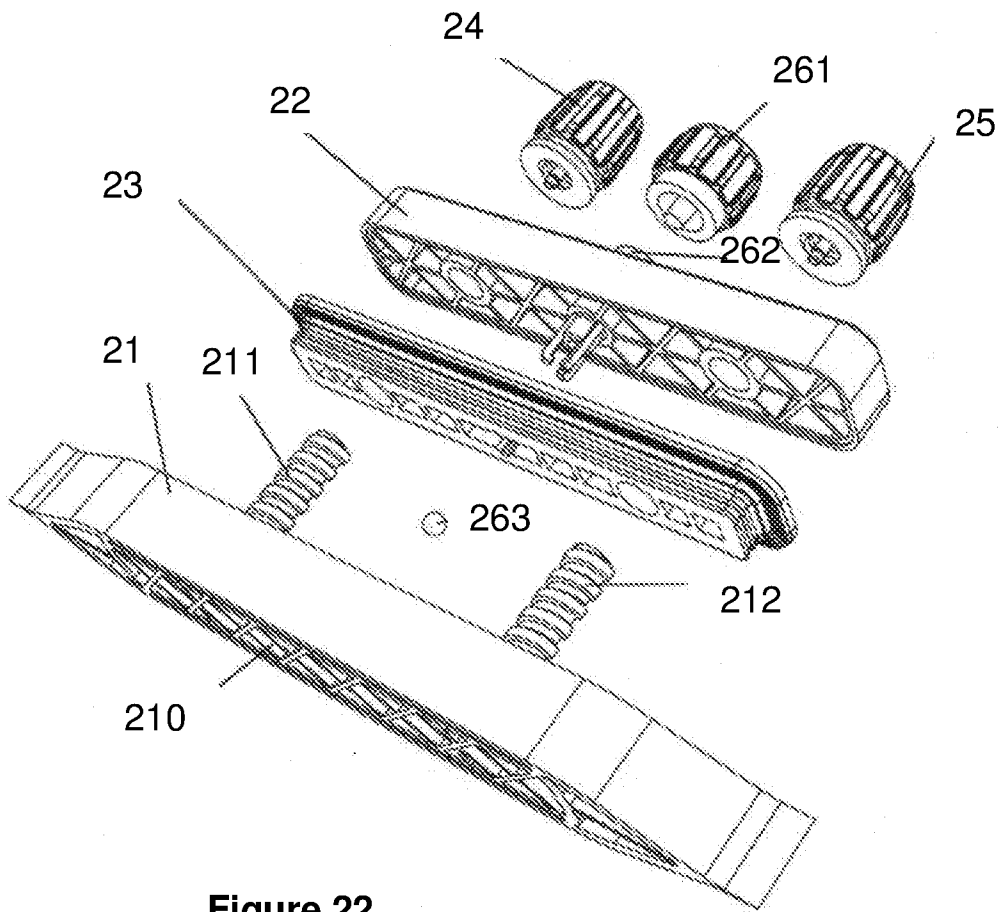


Figure 22

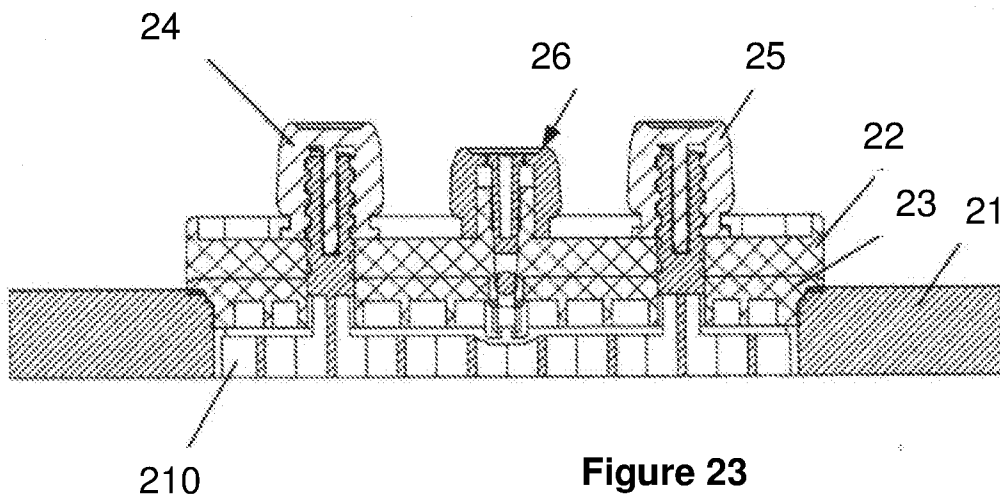


Figure 23

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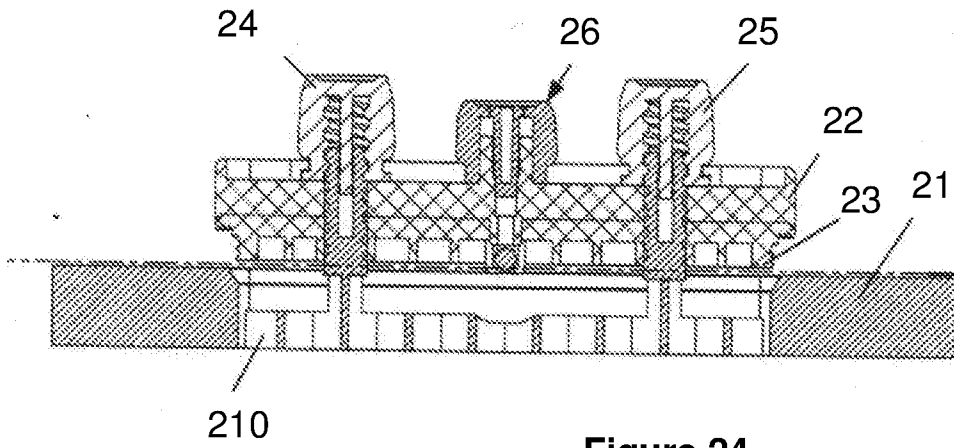


Figure 24

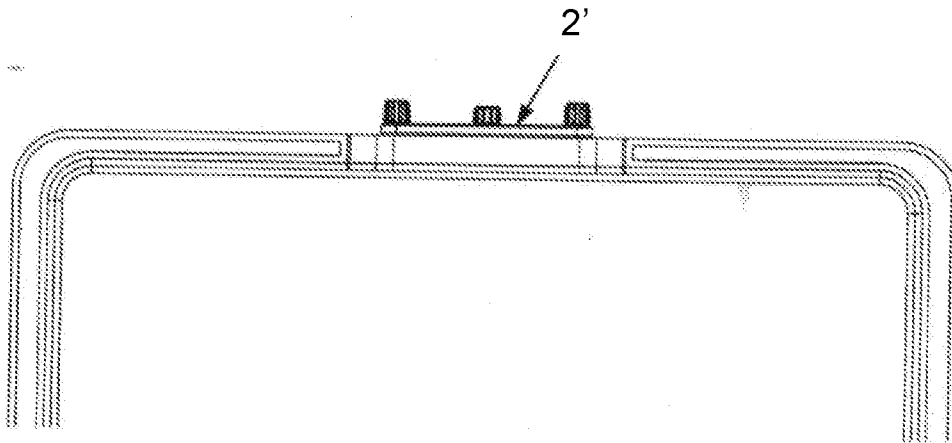


Figure 25

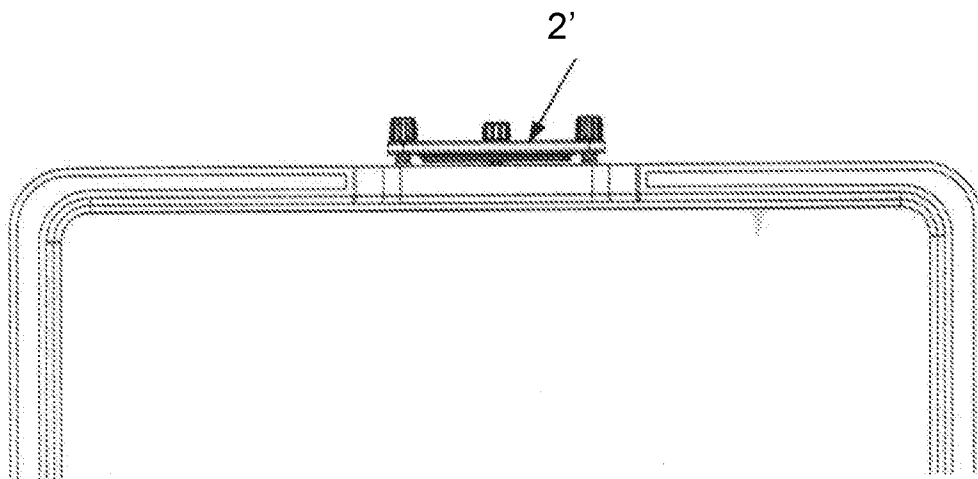


Figure 26

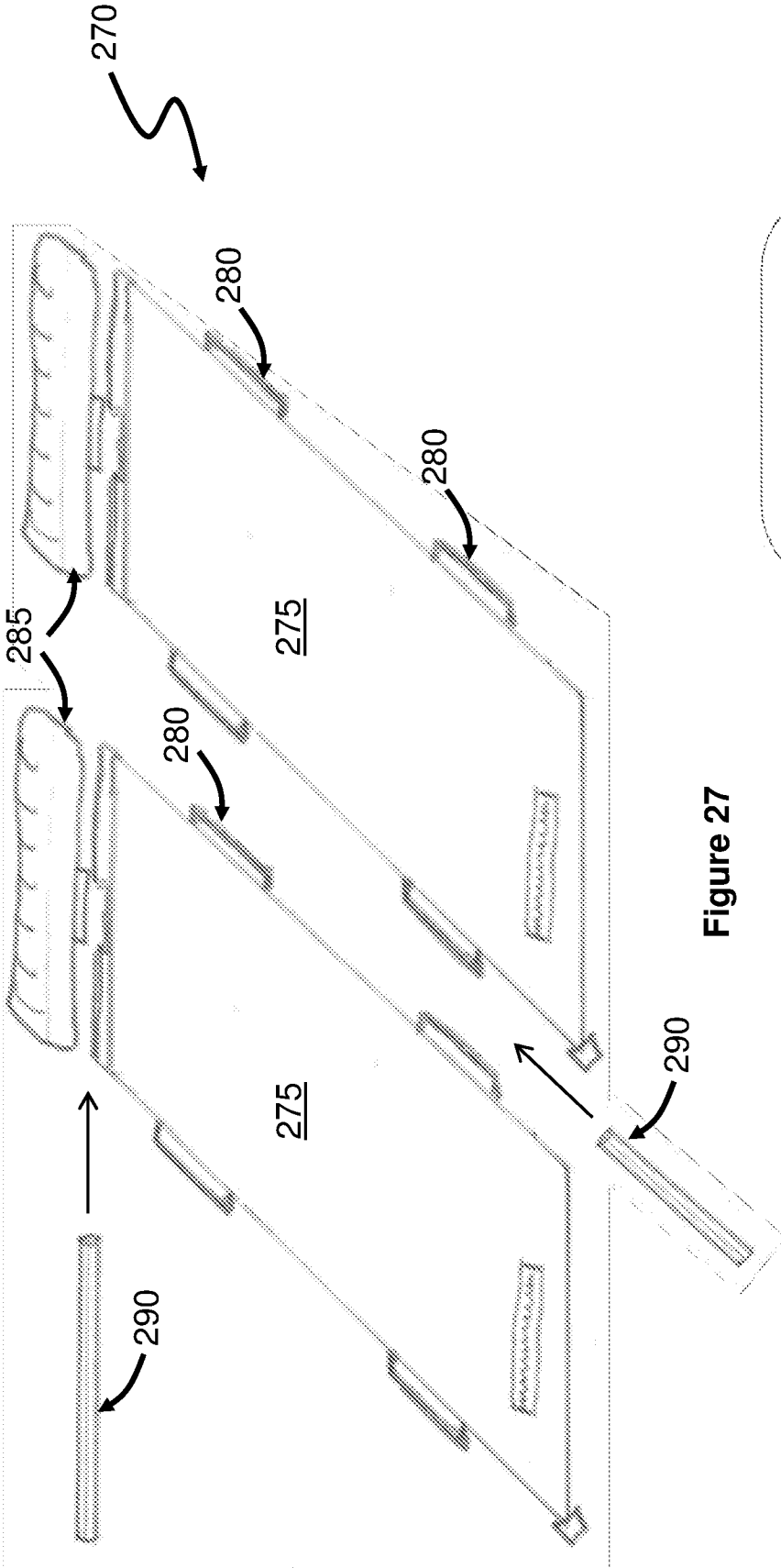


Figure 27

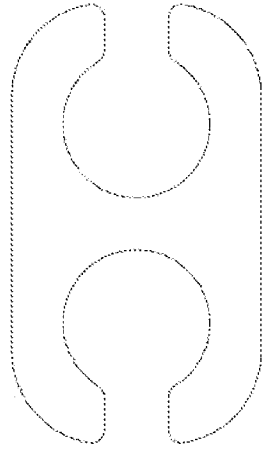


Figure 28

## A. CLASSIFICATION OF SUBJECT MATTER

A47C 27/08 (2006.01) A44B 19/32 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC: CPC A47C 27/084, 088 A44B 19/32 &amp; Key words (air\_tight, zip, seal, cap, slide, fastener, close, mattress, mat, sleeping\_bag, cushion, pad, padding, self\_inflate, pump, inflate, air, pneumatic, slide\_closure, valve) &amp; similar terms in Google Patents, Inventor applicant name search in Esp@cenet, AUSPAT carried out.

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

 Further documents are listed in the continuation of Box C See patent family annex

* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search  
16 May 2016Date of mailing of the international search report  
16 May 2016

## Name and mailing address of the ISA/AU

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## Authorised officer

Ponnamp Ponnampalam  
AUSTRALIAN PATENT OFFICE  
(ISO 9001 Quality Certified Service)  
Telephone No. 0262832070

INTERNATIONAL SEARCH REPORT C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		International application No. <b>PCT/AU2016/050169</b>
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1852151 A1 (PRESENCO) 07 November 2007 Abstract & fig 1	1, 2, 8-11
A	JP 3184468 U (MASHIMA) 27 June 2013 abstract & figs 1-6	1, 2, 8-11
A	JP 2007-82879 A (GOAL KK) 05 April 2007 ABSTRACT & FIGS 1-7	1, 2, 8-11

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:  
the subject matter listed in Rule 39 on which, under Article 17(2)(a)(i), an international search is not required to be carried out, including
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

**See Supplemental Box for Details**

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
**1, 2, 8-11**

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

**Supplemental Box****Continuation of: Box III**

This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

This Authority has found that there are different inventions based on the following features that separate the claims into distinct groups:

1. Claims 1, 2, (3, 4, 6, 7 in part), 8-11 & 21(in part). The feature of airtight zipper comprises an opening of the sealed inner space to allow air to flow into or out of the sealed inner space is specific to this group of claims.
2. Claims (3, 4, 6, 7 in part), 12-20, (21, 30 in part). The feature of roller-up tube is connected to one end of the mat by a connecting structure is specific to this group of claims.
3. Claims 22-31, (30 in part). The feature of screw clamping valve matched with an opening of the sealed inner space to allow air to flow in or out of the sealed inner space, the screw clamping valve comprising base and a clamping piece, and screw structure including at least a screw component, wherein the base is fixed to inflatable mat and is set with through openings, and the clamping piece can cover the base of the through opening and the clamping piece by the screw structure to form a sealing clamping fit is specific to this group of claims.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

When there is no special technical feature common to all the claimed inventions there is no unity of invention.

In the above groups of claims, the identified features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship. Therefore there is no special technical feature common to all the claimed inventions and the requirements for unity of invention are consequently not satisfied *a priori*.

It is considered that search and examination for the second and third invention will require more than negligible additional search and examination effort over that for the first and therefore an additional search fees is warranted for second & third inventions.

Claims 3, 4, 6, 7, 21 & 30.

Where appended claims introduce features of one of the claimed inventions and yet are additionally appended to claims directed to any other of the claimed inventions, such claims will only be searched and reported on to the extent that additional search fees have been paid for all such claimed inventions

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/AU2016/050169**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

<b>Patent Document/s Cited in Search Report</b>		<b>Patent Family Member/s</b>	
<b>Publication Number</b>	<b>Publication Date</b>	<b>Publication Number</b>	<b>Publication Date</b>
EP 1852151 A1	07 November 2007	EP 1852151 A1	07 Nov 2007
JP 3184468 U	27 June 2013		
JP 2007-82879 A	05 April 2007	None	

**End of Annex**