Section 29(1) Regulation 3.1(2)

AUSTRALIA PATENTS ACT 1990

MOTICE OF ENTITLEMENT

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being the applicant in respect of Application No. 43376/93, state the following:-

1. The person nominated for the grant of the patent: in the case of Kenneth Caldwell is the actual inventor, while Vera Caldwell is the assignee of the actual inventor.

The persons nominated for the grant of the patent: 2. are the applicants of the basic applications listed in the declaration lodged under Article 8 of the PCT.

The basic applications listed in the declaration made under Article 8 of the PCT are the first applications made in a Convention country in respect of the invention.

DATED this 29th day of November, 1994.

KENNETH CALDWELL AND VERA CALDWELL By their Patent Attorneys R K MADDERN & ASSOCIATES

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 (56) Prior Art Documents

(56) Prior Art Documents US 5109560 DE 2919438

(57)

It will thus be seen that in an embodiment of the present invention, wherein the air support means is in the form of a mattress or support surface, a multipressure zone system is provided therein which enables one portion of the mattress or support ______

surface to operate at one pressure and another position to operate at a different pressure. Accordingly, depending upon the illness and/or injury suffered by a patient, the pressure of the support mattress or support surface can be modified along its length to provide extra comfort for a patient. CLAIM

1. A zero-loss, multi-pressure air support system comprising an air support means in the form of a mattress assembly having a first plurality of inflatable, completely air-tight, air sacs forming first chambers which are connected together in at least first and second pressure zones, each of said pressure zones being operated at a pre-selected pressure, a specific pressure being selected for each zone, and multi-

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section pressure regulation means which operates to inflate said first pressure zone to a first pressure and operates to inflate said second pressure zone to a second pressure which is different from the first pressure, and further including a forced air ventilation means including a second plurality of inflatable air sacs with apertures forming second chambers, an air supply pump, a manifold, said second chambers being connected to the manifold, said air supply pump providing a stream of air through the manifold to said second plurality of inflatable air sacs, and said apertures providing an evenly distributed ventilation air stream.

3. A zero-loss air support system in the form of a mattress assembly having a surface comprising:

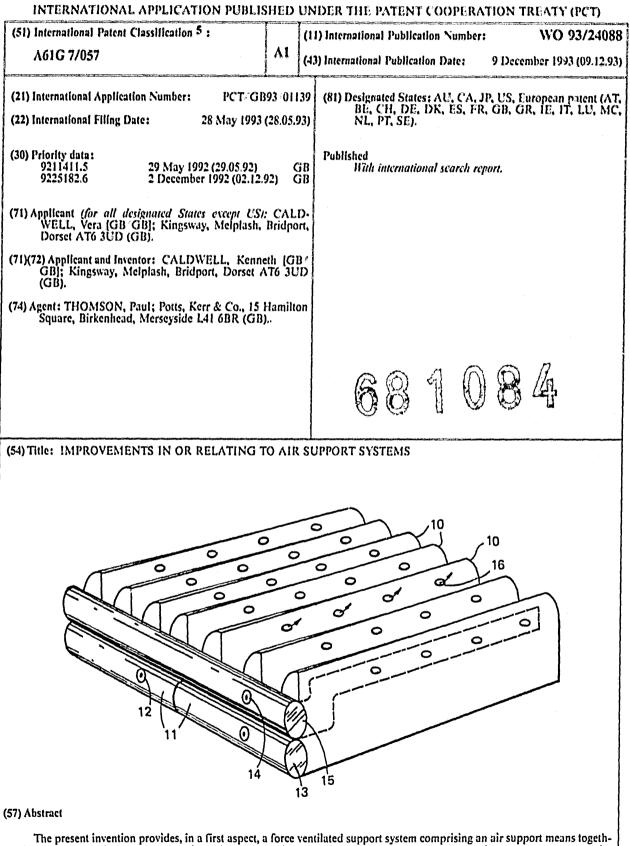
a first plurality of inflatable sacs which are completely air-tight connected together so as to form at least a first group and a second group of sacs, each group defining an individual pressure zone capable to operate at a different pressure;

means for applying pressure to each group of sacs until each zone is inflated to a different pre-selected pressure;

a second plurality of inflatable sacs with apertures defined therein; and

means for maintaining a continuous supply of forced air, said apertures providing an evenly distributed ventilating air stream along the surface of the mattress.





er with a forced ventilation means. The invention also provides, in a further aspect, a multi-pressure air support system comprising an air support means together with multi-pressure zone means. The system of the further aspect may be used in combination with, or separately from, the system of the first aspect of the invention.

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IMPROVEMENTS IN OR RELATING TO AIR SUPPORT SYSTEMS

The present invention concerns improvements in or relating to air support systems, and particularly to multi-pressure air support systems. In one aspect, the present invention relates to an air support system additionally including a forced ventilation system. In another aspect, the present invention relates to an air support system including multi-pressure zone air sacs. In certain situations, both aspects of the present invention can be used in combination.

The present invention has particular application in relation to air support systems utilised in the medical field, more particularly support systems such as a bed, pillow, cushion, chair or seat which incorporate an air support system, such as a plurality of air-tight air sacs or chambers. However, it is to be understood that the force ventilated support and the multi-pressure air support systems of the present invention, can also be utilised in connection with other air support systems, for example sun beds and the like.

It is well known in medical circles that low pressure air support systems are rated very highly in providing pressure relief to patients and elderly people who are at risk in developing pressure sores particularly, when confined to a bed for a long period of time.

There are various air support systems known including low loss air support systems, alternating pressure systems and static inflatable devices. There is particularly known a support apparatus comprising a frame with support members being mounted on such frame and a plurality of inflatable air sacs mounted on and operatively connected to such support members. Such beds usually have a low pressure air supply connected thereto, the pressure normally utilised being of the order of 25 mm Hg. The air sacs or air chambers are almost airtight with leakage at a planned rate from holes or stitch holes and may be linked together to form common

5 pressure zones. Such arrangement enables differing pressures to be applied to the differing groups of air sacs or chambers so as to provide a patient with a comfortable support system. Moreover, the frame is in the form of sections, the angles of which may be adjusted to assist in the comfort of the patient.

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Whilst such air support systems are well known and utilised in medical circles, the provision of totally air-tight sacs or chambers, particularly when grouped close together, do not allow for ventilation and can cause a patient to perspire heavily and become uncomfortably hot.

It is one object of the present invention to provide an air support system utilising one or more air-tight sacs or chambers, preferably linked together to form common pressure zones, together with an additional forced ventilation system, the combination being formed into a complete support system which may be in the form of a bed mattress or a seating support system.

According to one aspect of the present invention there is provided a forced ventilated support system, comprising an air support means together with a forced ventilation means.

In particular, according to this first aspect of the present invention, the air support means is a zero-loss, multi-pressure, air support system comprising an air support means in the form of a mattress assembly having a first plurality of inflatable, air-tight, air sacs forming chambers which are connected together in at least first and second pressure zones, each of said pressure zones being operated at a

30 pre-selected pressure, a specific pressure being selected for each zone, and multisection pressure regulation means which operates to inflate said first pressure zone to a first pressure and operates to inflate said second pressure zone to a second pressure which is different from the first pressure, and further including forced air ventilation means including a second plurality of inflatable air sacs with apertures forming second chambers, an air supply pump, a manifold, said second chambers being connected to the manifold, said air supply pump providing a stream of air

5 through the manifold to the inflatable air sacs, and said apertures providing a ventilation air stream.

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In the embodiment of such aspect of the present invention, the forced ventilation means is built into the walls of the air sacs, or comprises separate pads or jets inserted between adjacent air sacs, the forced ventilation means being in the form of a separate forced air supply whereby air is released from apertures provided in the walls of the sacs or from apertures provided in the interspaced pads or jets to provide a ventilating air stream to carry away the perspiration from the patient. In addition, the body temperature of the patient can be controlled by either heating or cooling of the forced air supply as required.

According to a second aspect of the invention, the zero-loss air support system in the form of a mattress assembly comprises:

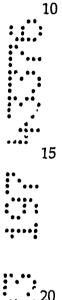
a first plurality of inflatable sacs which are completely air-tight connected together so as to form at least a first group and a second group of sacs, each group defining an individual pressure zone capable to operate at a different pressure; and means for applying pressure to each group of sacs until each zone is inflated to a different pre-selected pressure;

and further including a second plurality of inflatable sacs with apertures 25 defined therein; and

means for maintaining a continuous supply of forced air, said apertures providing a ventilating air stream.

The force ventilated support system according to these aspects of the present 30 invention has various advantages over the prior art, one distinct advantage being that the system of the invention is fail-safe and will not collapse when the power supply fails, the system continuing to support the patient as normal until resumption of the power supply takes place.

It will thus be seen that in one embodiment of the present invention, a force ventilated air support system is provided having a triple membrane arrangement, two of said membranes providing an air-tight inflatable air chamber or sac and the third, outer, membrane being connected at its edges to the edges of one of said other membranes, and having apertures therein to enable air to be forced out through said apertures.



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It has been found that such aspects of the present invention enable a low interface pressure between the body of a patient and the support system to be achieved. Utilising a Texas Interface Pressure Evaluator, it has been ascertained that an interface pressure of a bed incorporating a support system in accordance with the present in rention provides an interface pressure of the order of 16-22 mm Hg, depending on patient weight and physical characteristics.

In addition to being suitable as a support system for a bed, it is also possible to incorporate the force ventilated air support system of the present invention into a pillow for utilisation with a hospital bed. The pillow may have half its thickness filled with normal filling material and an inflatable core. Such core would be formed of a triple membrane arrangement as referred to above having apertures in the outer membrane. The two membranes forming the air-tight chamber or sac is firstly inflated to the required pressure. In this connection, the thickness of the pillow can be increased or decreased as desired by inflation of the air-tight inner core. The pillow may be piped into the air supply system of the bed with which the pillow is being utilised and fresh air is then forced through the apertures in the outer membrane providing the required ventilation through the pillow. Such arrangement assists in preventing perspiration in the neck and head region of a patient.

Whilst these aspects of the present invention have been described in connection with medical apparatus, it is also believed that the force ventilated air

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support system of the present invention could be utilised with various seating arrangements, such as car seats. In this connection, the base and the back of the seat could be divided into sections to provide the necessary support and then air would be blown continuously through the apertures or perforations in the leather or like

5 outer covering. Accordingly, a ventilated system will be provided the temperature of which could be controlled depending upon the time of the year the vehicle was being used. It will be possible to utilise a 12 volt pump which could be mounted in the car to provide the necessary air supply.

According to the present invention there is provided a multi-pressure air support system comprising an air support means together with multi-pressure zone means.

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The multi-pressure air support system of the present invention can be utilised in connection with the forced ventilated support system forming an aspect of the present invention. However, it is to be understood that the present invention can also be utilised with any other type of air support system.

The purpose of providing multi-pressure zones is to enable a greater degree of accuracy and fine control for the support of patients, for example, on inflatable support mattresses such as the zero air loss force ventilated support system as described in accordance with an aspect of the present invention, a low air loss system as well as independent sac support air systems.

25 The provision of two or more pressure zones or strata provides a safety higher pressure lower level, combined with a low interface pressure and high comfort upper level.

It will thus be seen that in an embodiment of the present invention, wherein 30 the air support means is in the form of a mattress or support surface, a multipressure zone system is provided therein which enables one portion of the mattress

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surface to operate at one pressure and another position to operate at a different pressure. Accordingly, depending upon the illness and/or injury suffered by a patient, the pressure of the support mattress or support surface can be modified along its length to provide extra comfort for a patient. It is believed that the present invention will have particular use in connection with providing pressure relief to patients and elderly people who are at risk in developing pressure sores, particularly when confined to a bed for a long period of time.

Whilst this further aspect of the present invention has been particularly described in relation to use with a medical support mattress, it is also believed that the multi-pressure zone air support system of the present invention could be utilised with other forms of seating arrangements.

The present invention will be further illustrated, by way of example, with reference to the accompanying drawings, in which Figs. 1 to 8 relate to a first aspect of the present invention and Figs. 9 to 14 relate to a further aspect of the present invention.

The basic principle of the zero loss force ventilated support system aspect of the present invention is illustrated in Fig. 1 which shows a series of air sacs or chambers 10 connected together in pressure zones 11. Such zones 11 are inflated or deflated by means of the inflation nozzle 12. The zones 11 remain at the presure so set via the inflation nozzle 12 using air from a load support air supply into the common manifold 13 via the zone inflation nozzle 12.

A stream of ventilation air is provided via the

ventilation air stream supply nozzle 14 to all the sacs 10 in common via the ventilation air stream supply manifold 15. The ventilation air stream is then evenly distributed along the full surface of the support system via air sac jets 16. In this connection, each air sac 10 preferably has a triple membrane form, two of said membranes forming an air-tight chamber into which air is supplied by means of manifold 13. The outer membrane of the sac 10 provides a space into which the ventilation air stream is supplied via manifold 15. The ventilation air stream then flows out of the air sac jets or apertures 16.

The system illustrated in Fig. 1 shows parts of a mattress system incorporating ventilation air stream apertures and is constructed in the manner indicated above.

Fig. 2 shows an alternative method of assembly utilising plug and socket means to connect the air sac and ventilation channels to the associated manifolds.

Fig. 3 shows another alternative method of air sac connection via plug and socket means.

Whilst the force ventilated system of the first espect of the present invention can be provided as a simple support mattress or seating unit, the system will be now illustrated in combination with a typical full hospital style or nursing home bed unit as shown in Fig. 4. In such arrangement, the support system of the present invention is mounted on a rigid bed frame 41 having a hinged support top surface 42 by which means the angles and posture of the mattress surface can be adjusted. The power to adjust the angles or posture of the hinged support surface 42 is provided by an



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inflatable head bellows 43 and foot bellows 44. The control of the bed angles or posture is available to the patient or nursing staff by means of a hand control push button unit 45 such that when the button to raise the head end of the bed is pressed, air from the air unit 46 is diverted to supply air to the bellows unit 43 and when the push button to lower is pressed, air from bellows 43 is released to atmosphere, thus allowing the bellows 43 to lower the head section of the bed.

Air pressure to the air sac or chamber pressure zones 47, 48 and 49 are controlled in a similar manner to the head and foot bellows 43 and 44, using push buttons on the hand control unit 45.

The ventilation air stream is flowing continuously whenever the pump unit 46 is running via the ventilation air stream supply line 50 to the common ventilation air stream manifold 51 for distribution along the bed surface via the ventilation air jets 16.

The hand control unit 45 has two push button control valves for each operation required of the bed or seating unit. Air from the pump unit 46 passes continuously through the control unit 45 and then through ventilation air stream supply 50 whilst the push buttons are non-active. When a button is pressed to supply power air to inflate or elevate a bed section, the continuous ventilation air stream supply 50 is temporarily cut off and directed via the button pressed to the appropriate bed section requiring air supply. When the button is released, the bed section so inflated is automatically sealed off and the air supply is restored to the ventilation air stream 50. When the push button to deflate a bed section is pushed, air from the section is released to atmosphere until the button is released.

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The deflate push button does not effect the ventilation air stream flow 50. A simple air controlled bed unit is illustrated in Fig. 5 having a portable air pump unit 52 which can be connected to any of the bed inflation points as needed to adjust pressure in the pressure zones via a plug and socket type connector in the load support air supply manifold 13 and when pressure adjustments are complete the pump unit 52 is connected to the ventilation air stream supply manifold 15.

A similar system of inflation and deflation control is utilised in the seat unit illustrated in Fig. 6, the seat and back unit illustrated in Fig. 7 and the seat, back and leg unit illustrated in Fig. 8.

It will thus be seen that the force ventilated support system in accordance with the first aspect of the present invention enables additional assistance to be provided to a patient or user of a device incorporating such support system, the force ventilated arrangement enabling the patient or user to remain comfortable.

It is clear that the various integers of the force ventilated support system of the first aspect of the present invention can be formed from any suitable type of materials and modifications can be utilised in connection with the load support air supply system and the ventilation air stream system, whilst still falling within the scope of the present invention.

The embodiment illustrated in Fig. 9 shows a mattress assembly 90 having a multiple section manifold whereby groups of air sacs 91 may be controlled collectively in strata and pressure zones. In this connection, the zones are arranged in groups horizontally and vertically in strata.



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In a preferred embodiment, the lowest strata level 92 would be quite firm, whereby the patient on the bed would not, under any circumstances, be able to sink through the lowest strata level which would be quite firm, whereby the patient on the bed would not, under any circumstances, be able to sink through the lowest level and thereby touch the bed base. On the other hand, the upper level pressure would be set so that the patient is allowed t: sink into the upper surface 93 and suitably be suspended just above the surface of the lower level. Further adjustment could be effected to provide maximum comfort in the full confidence that the patient could never reach the bed base through the lower level.

In a preferred embodiment, the horizontal upper strata zone pressures would be set to give typical settings as follows:

Upper body	Medium pressure	10-18	mm/Hg
Mid-section	Higher pressure	15-22	mm/Hq
Foot section	Low pressure	3-8	mm/Hg

Of course, it is to be understood that the pressures selected in the various sections of the mattress will be dependent upon patient weight and physical features.

Fig. 10 illustrates an airtight sac system in accordance with the further aspect of the present invention, but which does not require the ventilation air stream of the first aspect of the present invention.

It can thus be seen that a mattress or the like air support system can be made utilising a plurality of one or more air-tight membranes. Whilst the embodiment of Fig. 10 shows three pressure zones, 101, 102, 103, it is to be understood that any selected number of pressure zones can be provided. Moreover, as indicated above, the mattress can be made so as to be utilised with or without a forced ventilation air flow.

The embodiment illustrated in Fig. 11 indicates that independent internal pressurised devices or members 112 can be inserted into an air sac 111 and can be used, with or without internal air-tight membranes, so as to create pressure zones within pressure zones, as well as strata pressure zones. Thus, one can provide an inflatable member which is locatable in the air sac and which, in use, will act in a similar manner to the invention by providing multi-pressure zone air sacs.

Fig. 12 illustrates a section of a low air loss support system sac 120, into which has been incorporated nominally air-proof membrane 121 which has а been perforated by the provision of carefully graded holes 122, thereby allowing air to pass through the membrane at a controlled rate relative to the air losses through stitch holes in the upper half of the sac. Such holes may be replaced by an adjustable valve or pressure regulator 123 built in to the membrane or by a separate feed nozzle from the air supply 124. The arrangement of Fig. 12 makes it possible to adjust the pressure in the upper part of the sac to a lower pressure than that in the lower part of the sac. This type of control is suitable for use with twin nozzles or single nozzle low air loss support systems.

Fig. 13 diagrammatically illustrates a single pressure element bed 130, viz, in which the whole sac is at one pressure. Fig. 13 also shows the bed to be divided, along its length, in three pressure zones 131. 132, 133. Each zone comprises a group of sacs and the zones or sac groups are arranged so that different parts of the body can be supported at the o_{Desemum} pressure setting to give lowest interface pressure and maximum comfort.

It can clearly be seen that if the bed had only a single continuous zone which was at one pressure throughout its length, then the pressure generated by the weight of a patient would be common throughout. In effect, this would mean that unduly high pressures would be transmitted to areas such as the heels, which would be at the same pressure as at the mid-section. Thus, for example, if a pressure of 20 mm/Hq was present under the mid-section 132, this would also apply 20 mm/Hg to the heel section 133. On the other hand, with a multi-zoned air pressure system of the invention, the pressure applied to the heel section 133 would typically be of the order of 3-8 mm/Hg.

It is to be noted that the arrangement of the horizontal pressure zones can be extremely important and can be utilised in any multiple form depending upon the special effect required.

Fig. 14 schematically illustrates a multipressure air support system in accordance with the further espect of the present invention incorporated within a mattress cover 140. The upper surface of the mattress is usually water vapour permeable to prevent soiling, but will allow perspiration to pass through and to allow for surface washing. As illustrated, the interior of the mattress cover has vertical dividers 141 across the bed attached to the bottom and top sides of the mattress cover.

Again as illustrated, the inflatable sac elements 142 pass between the vertical dividers 141 and are 10.

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therefore loosely held in place whilst at the same time being separated from one another. This arrangement allows the sacs to move easily but at the same time be retained in their allotted space even when the sac is less than half full of air and is accordingly quite flaccid.

The control of the semi-inflated sac elements 142 referred to above is generally to prevent the sacs from being pushed apart when a patient is restless on the bed and prevents the patient from falling between the sacs to land or bottom out on the bed frame.

It will thus be seen that the multi-pressure zone air support system in accordance with the further aspect of the present invention enables the pressure in an air support system to be varied along its depth and/or length. In the case of a mattress, as indicated above, it can clearly be seen that a patient can be made far more comfortable by the use of multi-pressure zone air sacs than with a bed at a constant pressure.

It is clear that the various components of the multi-pressure zone air support system of the further aspect of the present invention can be formed from any suitable type of materials and modifications can be utilised in connection with the manner in which the multi-pressure zone arrangement is achieved, whilst still falling within the scope of the present invention.

The claims defining the invention are as follows:

A zero-loss, multi-pressure air support system comprising an air support
 means in the form of a mattress assembly having a first plurality of inflatable,
 completely air-tight, air sacs forming first chambers which are connected together in
 at least first and second pressure zones, each of said pressure zones being operated at
 a pre-selected pressure, a specific pressure being selected for each zone, and multi section pressure regulation means which operates to inflate said first pressure zone
 to a first pressure and operates to inflate said second pressure zone to a second

pressure which is different from the first pressure, and further including a forced air ventilation means including a second plurality of inflatable air sacs with apertures forming second chambers, an air supply pump, a manifold, said second chambers being connected to the manifold, said air supply pump providing a stream of air through the manifold to said second plurality of inflatable air sacs, and said apertures providing an evenly distributed ventilation air stream.

2. The zero-loss, multi-pressure air support system according to claim 1, further including a group of completely air-tight inflatable sacs forming chambers which are connected to form a third pressure zone, a pressure being selected for said third pressure zone, and wherein the multi-section pressure regulating means operates to inflate said third pressure zone to a pressure selected to be different from the first and from the second pressure.

3. A zero-loss air support system in the form of a mattress assembly having a surface comprising:

a first plurality of inflatable sacs which are completely air-tight connected together so as to form at least a first group and a second group of sacs, each group defining an individual pressure zone capable to operate at a different pressure;

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means for applying pressure to each group of sacs until each zone is inflated to a different pre-selected pressure;

a second plurality of inflatable sacs with apertures defined therein; and



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means for maintaining a continuous supply of forced air, said apertures providing an evenly distributed ventilating air stream along the surface of the mattress.

5 4. The zero-loss air support system according to claim 3, wherein said means for applying pressure includes a first manifold connected to apply pressure to the first group of sacs; a second manifold connected to apply pressure to the second group of sacs; and means for supplying pressure to said first and said second manifolds.

5. The zero-loss air support system according to claim 4, further including a third group of completely air-tight inflatable sacs connected to form a third group defining a further pressure zone, and wherein said means for applying pressure includes a third manifold connected to the third group of sacs for applying pressure to said third manifold, so that each pressure zone is maintained at a constant preselected pressure.

6. The zero-loss air support system according to claim 3, 4 or 5, wherein said means for maintaining a continuous supply of forced air includes a manifold connected to said second plurality of inflatable sacs, and a source of air under pressure for maintaining the second plurality of sacs inflated while the ventilating air stream is provided.

7. The zero-loss support system according to claim 2, 3, 4, 5 or 6, wherein an inflatable sac of the first plurality of sacs and an inflatable sac of the second plurality of sacs are formed by a triple membrane arrangement, two of the membranes providing a completely air-tight chamber and a third, outer membrane having apertures, said outer membrane connected so as to form a chamber which is capable to discharge a ventilating air stream.



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8. A zero-loss, multi-pressure air support system, substantially as hereinbefore described with reference to the accompanying drawings.

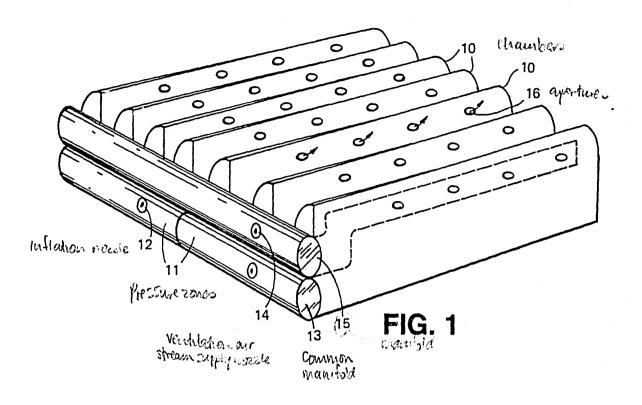
5 Dated this 6th day of June 1997. KENNETH CALDWELL and VERA CALDWELL By their Patent Attorneys MADDERNS

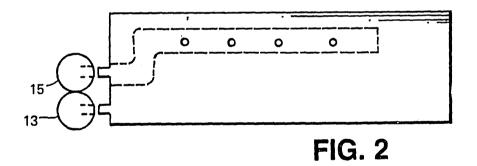
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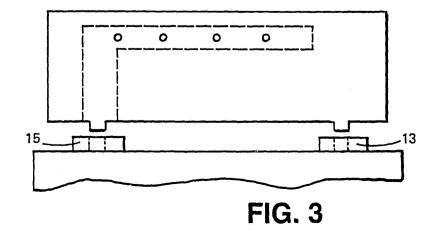


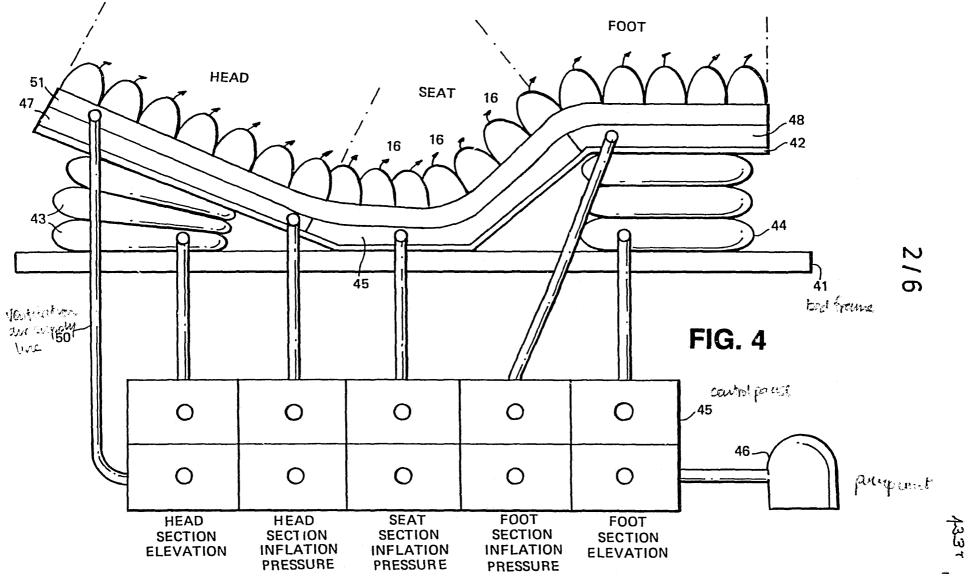


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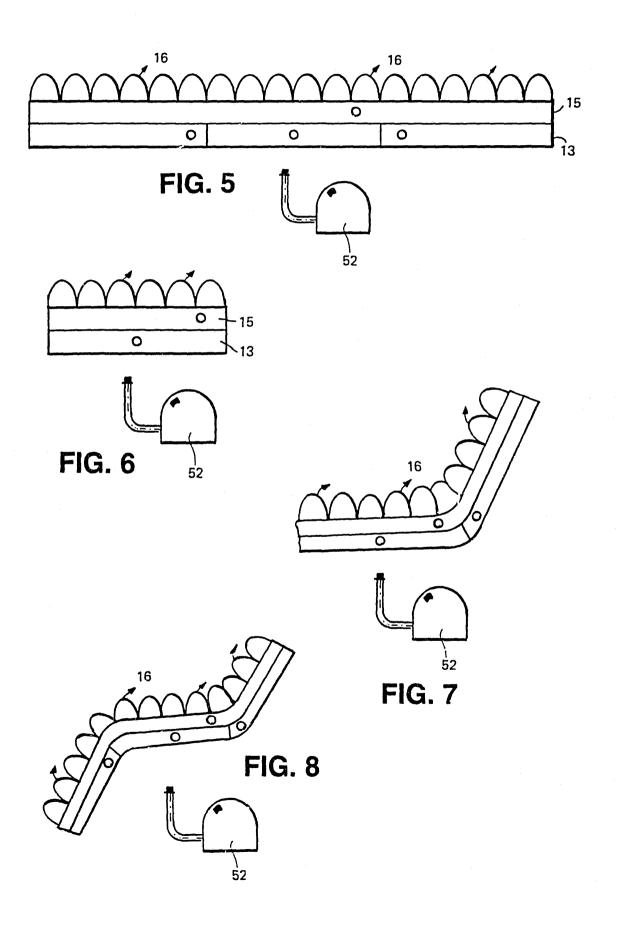




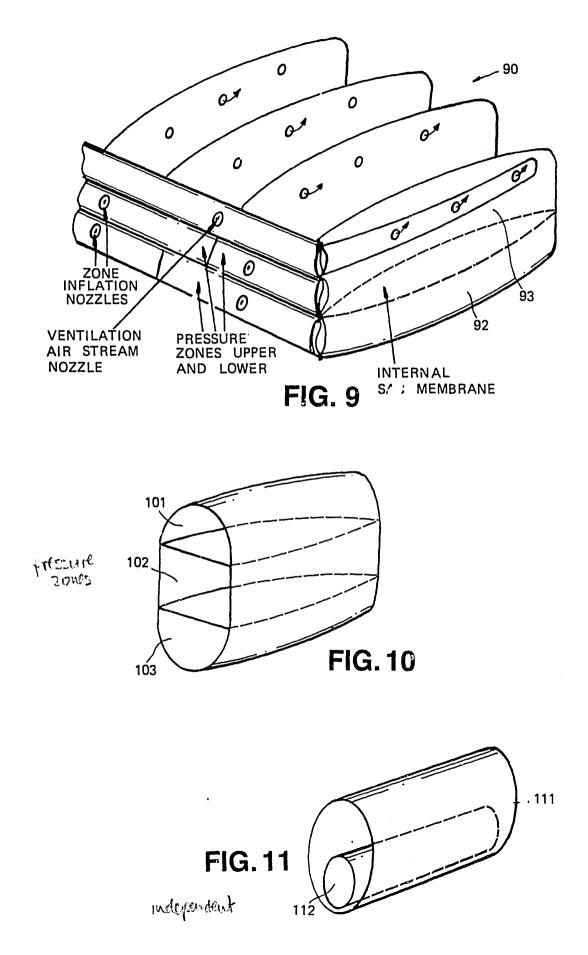


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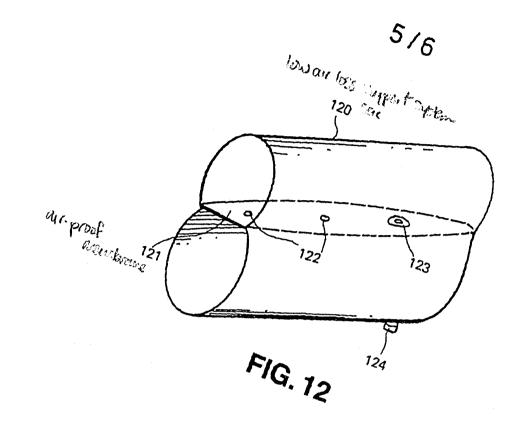
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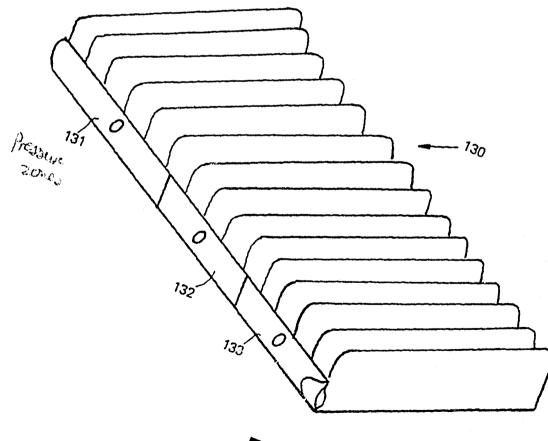
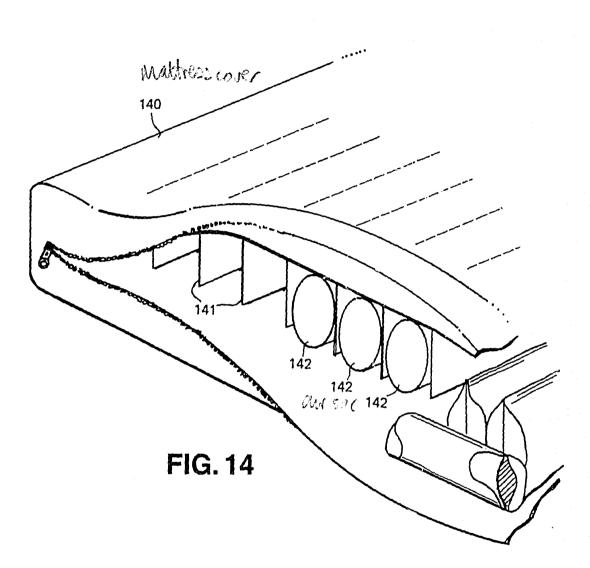


FIG. 13

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ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

GB 9301139 SA 74868

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 21/0 21/09/93

Patent document cited in search report	Publication date	Patent family member(s)		Publication date	
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US-A-5109560	05-05-92	None			
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US-A-3298044		None			

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

INTERNATIONAL SEARCH REPORT

· • • •		International Application No	CT/GB	93/01139
I. CLASSIFICATION OF SUB.	JECT MATTER (if several classification s			
	nt Classification (IPC) or to both National C			ladaren errendean erre
II. FIELDS SEARCHED				
	Mínímum Docume	entation Searched?		
Classification System		Classification Symbols		
Int.Cl. 5	AC1G ; A47C			
	Documentation Searched other to the Extent that such Documents a			
III. DOCUMENTS ONSIDER				
Category ° Citation of D	ocument, 11 with indication, where appropria	ite, of the relevant passages 12	Relevant	to Claim No. ¹³
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5 May 1 see col	109 560 (TSUYOSHI UETAKI 992 umn 3, line 36 - column 1,7,8,9		1-4, 10-12	2,14
16 May	545 806 (HOPKINS) 1979 e 4, line 17 - line 89;	figures	1-4, 10-12	2,14
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	umn 2, line 11 - line 30	5; figures	9	
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considered to be of partic "F." earlier document but publ filing date "I." document which may thro which is cited to establish citation or other special re "O" document referring to an other means	neral state of the art which is not ular relevance ished on or after the international w doubts on priority claim(s) or the publication date of another eason (as specified) oral disclosure, use, exhibition or to the international filing date but	 "T" later document published after the interm or priority date and not in conflict with the cited to understand the principle or theory invention "X" document of particular relevance; the clai cannot be considered novel or cannot be of involve an inventive step "Y" document of particular relevance; the clai cannot be considered to involve an invent document is combined with one or more of ments, such combination being obvious to in the art. "&" document member of the same patent fam 	he application y underlying i imed invention considered to imed invention ive step when other such doo o a person ski	hut the n the cu-
IV. CERTIFICATION				
Date of the Actual Completion of t 21 SEPTEME		Date of Malling of this International Sear	Ē	1 2
			23.09.9	13
International Searching Authority EUROPEA	AN PATENT OFFICE	Signature of Authorized Officer BAERT F.		

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III. DOCUME	NTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)	
Category D	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
(DE,A,3 320 771 (NOACK) 13 December 1984	1-3
\	see page 14, line 6 - line 20; figures 1,6	13
	EP,A,O 292 218 (HILLENBRAND IND.) 23 November 1988	1,2,4
	see column 1, line 39 - column 2, line 13 see column 6, line 55 - column 7, line 17; figures 1-4,6	13
	GB,A,1 420 221 (HOWORTH AIR CONDITIONING LTD.) 7 January 1976 see page 1, line 20 - line 28; figures	6,7
	US,A,3 298 044 (SALTNESS)	6,7
	17 January 1967 see column 1, line 9 - line 33; figures	
	1,2	

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