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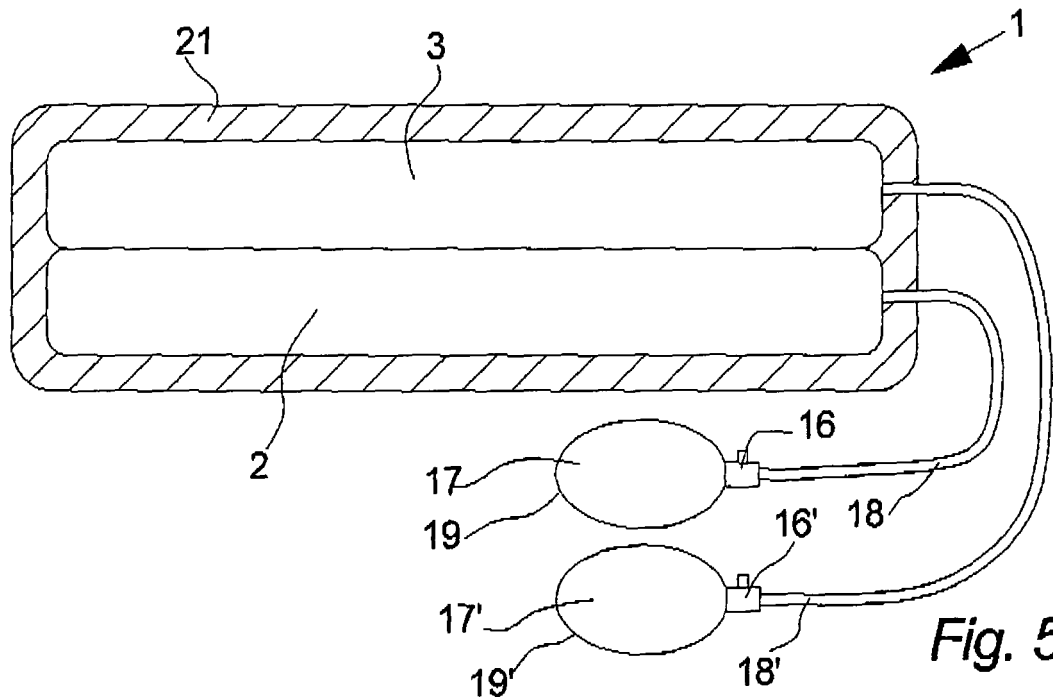
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(54) **Adjustable pillow**

(57) The invention relates to a pillow (1), comprising at least one chamber (2) with means for adjusting the pillows (1) height (H). The pillow (1) further comprises at least one further chamber (2) with means for adjusting the pillows (1) hardness, wherein the at least one chamber (2) for adjusting the pillows (1) height (H) and the at

least one chamber (3) for adjusting the pillows (1) hardness, are placed vertically on top of each other, and wherein said means for adjusting the pillows (1) hardness and said means for adjusting the pillows (1) height (H) comprises at least one air pump (17) for inflating said chambers (2, 3).



**Fig. 5**

## Description

### Background of the invention

**[0001]** The invention relates to a pillow according to the preamble of claim 1.

**[0002]** Inflatable pillows of various kinds are well known in the art, and particularly in the field of health care, inflatable pillows are used for obtaining better comfort or to relief or prevent different illnesses or injuries such as e.g. bedsores or whiplash pains. Typically an inflatable pillow comprises a chamber possibly subdivided into sections connected to one another, here the height of the pillow is adjusted by means of an air pump and a valve.

**[0003]** An example of this is shown in US patent no. US 6,189,168 B1, where a number of interconnected sections together constitute a pillow. The pillow can be inflated by squeezing a bulb pump, and deflated by activating a spring-loaded pressure relief valve. However, the pillow is not necessarily very comfortable in use, in that only the pillows height can be adjusted.

**[0004]** Another way of providing an inflatable pillow is disclosed in Japanese patent application JP 2000-005012, where two independently inflatable chambers are placed on top of each other. The bottom chamber is for adjusting the pillows angle, and the top chamber adjusts the pillows height. The chambers are surrounded by foam rubber and cotton material, defining the pillows hardness. Since this material surrounding the chambers is permanently attached, only the pillow height and angle can be adjusted.

**[0005]** An object of the invention is to provide for a pillow where both the pillows height and hardness can be adjusted. Furthermore it is an object of the invention to provide for a pillow which can be adjusted by the user alone in a gentle and controlled manner.

### The invention

**[0006]** The invention relates to a pillow comprising at least one chamber with means for adjusting the pillows height. Said pillow comprises at least one further chamber with means for adjusting the pillows hardness, wherein said at least one chamber for adjusting the pillows height and said at least one chamber for adjusting the pillows hardness are placed vertically on top of each other, and wherein said means for adjusting the pillows hardness and said means for adjusting the pillows height comprises at least one air pump for inflating said chambers.

**[0007]** Hereby is achieved a very comfortable pillow in that both the pillows hardness and height can be adjusted.

**[0008]** It is advantageous to use an air pump to inflate the chambers in the pillow, in that an air pump is easy to use and operate, e.g. compared to inflating the chambers by use of human lungs.

**[0009]** In an aspect of the invention, said means for

adjusting the pillows hardness and said means for adjusting the pillows height may be operated individually.

**[0010]** It is advantageous to adjust the pillows hardness and height individually, in that it enables the possibility of adjusting the pillow to suit the needs of different users.

**[0011]** In an aspect of the invention, said at least one air pump is manually operated.

**[0012]** It is advantageous to use a manually operated air pump, in that it is very inexpensive compared to motorized or power operated pumps.

**[0013]** It should be emphasized that by the term "manually operated air pump", is meant an air pump which is not equipped with any kind of motor or any other power driven equipment. It could e.g. mean a bulb pump which produces an air flow when it is squeezed by hand.

**[0014]** In an aspect of the invention, said means for adjusting the pillows hardness and said means for adjusting the pillows height comprises at least one externally or internally connected pressure relief valve for deflating said chambers.

**[0015]** Providing the pillow with one or more externally or internally connected pressure relief valves is advantageous in that provides for simple means for adjusting the pillows height and/or hardness.

**[0016]** In an aspect of the invention, said at least one pressure relief valve is manually operated.

**[0017]** It is advantageous to use a manually operated pressure relief valve, in that it is very inexpensive compared to power operated valve and other types of valves.

**[0018]** In an aspect of the invention, said pillow has only one chamber for adjusting the pillows hardness and only one further chamber for adjusting the pillows height.

**[0019]** By making the pillow with only two chambers the pillow becomes easy to operate and inexpensive to manufacture.

**[0020]** In an aspect of the invention, said at least one chamber for adjusting the pillows hardness and/or said at least one chamber for adjusting the pillows height are subdivided into more than one interconnected sections e.g. a plurality of juxtaposed sections.

**[0021]** Subdividing one or more chambers into several interconnected sections is advantageous, in that it helps to maintain the chambers internal stability and external shape, more or less independent of the pressure inside the chambers.

**[0022]** In an aspect of the invention, said more than one interconnected sections are formed as rectangular juxtaposed sections each substantially extending in said pillows entire longitudinal extent.

**[0023]** By forming the interconnected sections as rectangular juxtaposed sections, which extends substantially in the pillows entire longitudinal extent, it is possible to ensure that the pillow provides good support to the head of the user.

**[0024]** When the juxtaposed sections are placed parallel with longitudinal extent of a person using the pillow, the sections under the users head will be compressed,

hereby increasing the pressure in the sections extending beside the head, making the "uncompressed" sections fixated the head against transverse motion or rotation. This is advantageous for providing the uses with comfortable head support, and it is especially advantageous if the user suffers from whiplash pain or other pains in the iteck or upper back.

**[0025]** In an aspect of the invention, said at least one chamber for adjusting the pillows hardness and/or said at least one chamber for adjusting the pillows height are subdivided into between 1 and 20, preferably between 2 and 15 and most preferred between 4 and 8 interconnected sections.

**[0026]** If a chamber is subdivided into to few interconnected sections the pillow will not be so efficient at fixating the users head. If a chamber is subdivided into too many interconnected sections the pillow becomes expensive to manufacture. The present number ranges therefore provides for an advantageous relation between usability and cost.

**[0027]** In an aspect of the invention, said at least one chamber for adjusting the pillows hardness and/or said at least one chamber for adjusting the pillows height are formed substantially identically.

**[0028]** Forming the chambers substantially identically is advantageous, in that it provides for a simple pillow design and thereby reduces the manufacturing costs.

**[0029]** In an aspect of the invention, said pillow has a transverse extent of between 200 and 1500 mm, preferably between 350 and 1100 mm, and most preferred between 500 and 850 mm.

**[0030]** If the pillow is too narrow it will not be so efficient at fixating the users head. If the pillow is too wide it becomes too expensive to manufacture. The present width ranges therefore provides for an advantageous relation between usability and cost.

**[0031]** In an aspect of the invention, said pillow has a vertical height of between 10 and 400 mm, preferably between 35 and 280 mm, and most preferred between 70 and 160 mm when fully or substantially fully inflated.

**[0032]** If the pillow is too low it will not be so efficient at fixating the users head and it could be become uncomfortable to use. If the pillow is too high it becomes too expensive to manufacture and it could also become uncomfortable to use. The present height ranges therefore provides for an advantageous relation between usability, comfort and cost.

**[0033]** In an aspect of the invention, one or more kinds of pillow material such as foam rubber, natural or synthetic fibres or other suitable materials, surrounds the two or more chambers.

**[0034]** The chambers could be made of an airtight material like e.g. rubber or polyurethane. This material is not very comfortable touching the skin directly. It is therefore advantageous to surround the chambers by a more comfortable and suitable pillow material.

**[0035]** In an aspect of the invention, said at least one chamber for adjusting the pillows hardness, said at least

one chamber for adjusting the pillows height and/or the different sections of said chambers are made of material with different elasticity, respectively.

**[0036]** Making the chambers of material with different elasticity is advantageous, in that is an easy and inexpensive way of obtaining the desired qualities.

**[0037]** In an aspect of the invention, said at least one chamber for adjusting the pillows hardness is placed on top of said at least one chamber for adjusting the pillows height.

**[0038]** It is advantageous to place the at least one chamber for adjusting the pillows hardness at the top of the pillow, in that this is the part of the pillow that the users head rests on.

**[0039]** In an aspect of the invention, said at least one chamber for adjusting the pillows hardness is of a substantially constant volume independent of the pressure inside said at least one chamber.

**[0040]** When adjusting the pillows hardness it is advantageous, if the chamber maintains a substantially constant volume, so that the height of the pillow is not affected.

**[0041]** In an aspect of the invention, primarily the vertical extent, of said at least one chamber for adjusting the pillows height, change when the pressure inside said at least one chamber change.

**[0042]** It is advantageous if the pillow primarily gets higher when the at least one chamber for adjusting the pillows height is inflated, in that a horizontal or general extension could cause discomfort for the user.

**[0043]** The invention further relates to use of a pillow for therapeutical purposes.

**[0044]** For a person with e.g. whiplash pain or another neck injury, it can be very painful to arrange an ordinary pillow know in the art, to give comfortable head support. The multi adjustable pillow that the invention relates to is advantageous for therapeutical use in that, it is possible for the user to do the adjustment alone and in that, said adjustment can be done very gentle, inflicting very little or no pain on the user.

## Figures

**[0045]** The invention will be described in the following with reference to the figures in which

fig. 1 illustrates a cross-section of a pillow as seen from the front,

fig 2 illustrates the same embodiment of a pillow as illustrated in fig. 1 as seen from the top,

fig 3 illustrates another embodiment of a pillow as seen from the top,

fig. 4 illustrates in cross-section an embodiment of a pillow comprising pillow material as seen from the front,

- fig. 5 illustrates a cross-section of a pillow comprising adjustment means as seen from the front,
- fig. 6 illustrates a cross-section of a pillow comprising another embodiment of adjustment means as seen from the front,
- fig. 7 illustrates a cross-section of a person using the pillow as seen from the side, and
- fig. 8 illustrates a pillow comprising multiple adjustment means as seen from the top.

### Detailed description

**[0046]** Fig. 1 illustrates, as seen from the front, an embodiment of a pillow 1 comprising a bottom chamber 2 and a top chamber 3 divided into sections 4 that are connected by holes 5 in the section walls 6.

**[0047]** In this embodiment of the invention the bottom chamber 2 is for adjusting the pillows 1 height. The bottom chamber 2 is made as a sort of a hollow rubber cube, where the top wall 7 and the bottom wall 8 is thicker than the side walls 9. By making the top 7 and bottom walls 8 relatively rigid compared to the side walls 9, inflating and deflating the bottom chamber 2 will result in a vertical movement of the top wall 7, in that the top 7 and bottom walls 8 more or less keep their shapes, while the side walls 9 are stretched.

**[0048]** The top 7 and bottom walls 8 of the bottom chamber 2 could in another embodiment of the invention be made of a different material than the side walls 9. The top 7 and bottom walls 8 could be a plate made of e.g. plastic, wood or another inelastic material, which were joined by e.g. a rubber membrane constituting the bottom chambers 2 side walls 9. When inflating such a bottom chamber 2 the pressure of the air would push the top wall 7 upwards.

**[0049]** In this embodiment of the invention the top chamber 2 is for adjusting the pillows 1 hardness. In the top chamber 3 the side walls 10 and section walls 6 are made of a material thicker than the top walls 11, making the top surface 13 more or less hard when inflating or deflating the top chamber 3. In another embodiment of the invention the side 10, top 11, bottom 12 and section 6 walls could be made of relatively inelastic material, e.g. like the material air madras's known in the art are made of. Consequently the top chamber 3 would maintain a substantially constant volume independent of the air pressure inside the chamber 3, and only the pillows softness/hardness will change.

**[0050]** In this embodiment of the invention the top wall 7 of the bottom chamber 2 constitutes the bottom wall 12 in the top chamber 3. In another embodiment of the invention the top chamber 3 could have its own bottom wall 12 separate from or attached to the top wall 7 of the bottom chamber 2.

**[0051]** Fig. 2 illustrates in top view the same embodi-

ment of a pillow 1 as illustrated in fig.

1. In this embodiment of the invention the section walls 6 extends the entire length of the top chamber 3, and the top chamber 3 is slightly smaller than the bottom chamber

2. In another embodiment of the invention the section walls 6 could be shorter than the length of the top chamber 3, and the chambers 2,3 could be of equal size or the top chamber 3 could be bigger than the bottom chamber 2.

**[0052]** In this embodiment of the invention the pillow 1 has a substantially rectangular shape, but in another embodiment of the invention the pillow 1 could be square, round or have some sort of ergonomic shape adapted for optimal head support.

**[0053]** Fig. 3 illustrates in top view a pillow 1 where the top chamber 3 is divided into interconnected substantially square sections 4 by section walls 6 extending both across and lengthwise. In another embodiment of the invention the bottom wall 12 and the top wall 11 could be joined only in strategically placed points by string integrated in the material or separate strings, rubber bands or other.

**[0054]** Fig. 4 illustrates a cross-section of a pillow 1 as seen from the front. In this embodiment of the invention the chambers 2, 3 are surrounded by pillow material 21 permanently attached to the chambers 2, 3. This pillow material 21 could be an inner layer 14 of e.g. foamed rubber and an outer layer 15 of e.g. natural fibers such as cotton or synthetic fibers kept in by an outer casing 22 of a suitable material such as e.g. woven cotton. In another embodiment of the invention the chambers 2, 3 could be separate from a possible casing. The chambers 2, 3 could for instance be put into a sealable foamed rubber casing or a cotton casing, which could be removed and washed separately.

**[0055]** Fig. 5 illustrates a cross-section of a pillow 1 as seen from the front. In this embodiment of the invention the two chambers 2, 3 is surrounded by a single layer of pillow material 21.

**[0056]** The pillow 1 is provided with means for adjusting the pillow 1 height in form of a bulb pump 17 with an integrated pressure relief valve 16 connected to the bottom chamber 2 by means of a hose 18 made of e.g. plastic, rubber or other.

**[0057]** The relief valve 16 could also be placed separate from the pump means, either on the hose, integrated in or at the chambers or other, or it could simply be a sealable opening in the chambers 2, 3. The valve 16 could be spring-loaded making the air bleed by pressing a button, it could be provide with a screw that allows airflow to pass when the screw is turned or other.

**[0058]** Similarly is the top chamber 3 connected to another bulb pump 17' with an integrated pressure relief valve 16' by means of a hose 18'.

**[0059]** The bulb pumps 17 is of a type commonly

known from blood pressure measurement equipment, and is operated by squeezing the bulb 19 hereby increasing the pressure in the connected chamber. To lower the pressure or deflate the chambers 2, 3, the valve 16 is actuated, which bleeds air from the chambers 2, 3.

**[0060]** Furthermore, fig. 5 illustrates that the chambers 2, 3 are in this embodiment of the invention are formed identically.

**[0061]** Fig. 6 illustrates a cross-section of a pillow 1 as seen from the front. The chambers 2, 3 are connected to a bulb pump 17 with integrated pressure relief valve 16 by means of hoses 18 joined in a direction valve 20 for directing the air flow to either the top 3 or bottom chamber. The direction valve 20 is manually operated.

**[0062]** In another embodiment of the invention the air for pressurizing the chambers 2, 3 could be supplied by an electrical powered air compressor, caned pressurized air, human lungs or other.

**[0063]** Fig. 7 illustrates in cross-section an embodiment of the invention being used by a person as seen from the side. The top chamber 3 for adjusting the pillows 1 hardness is drastically deformed by the weight of the persons head, while the bottom chamber 2 for adjusting the pillows 1 height is only slightly deformed.

**[0064]** Fig. 8 illustrates a pillow 1 comprising a bottom chamber 2 (possible divided into several interconnected sections 4) and a number of top chambers 3. Fig. 8 illustrates four separate juxtaposed top chambers 3 divided by dividing walls 24, but it could be any number between one to hundred separate chambers.

**[0065]** The top chambers 3 are connected to one common bulb pump 17 by means of hoses 18. In another embodiment of the invention each separate chamber could be connected to separate bulb pumps 17. Close to or at each chamber 3 the hoses 18 are provided with a one-way valve 23 and a relief valve 16. The one-way valves 23 ensures that the air provided from the pump 17 can only pass into the top chambers. The relief valves 16 ensure that each top chamber 3 can be deflated individually.

**[0066]** In another embodiment of the invention the pillow 1 could be provided with a separate top chamber 3 at the front of the pillow 1 to adjust the hardness of a neck support (not shown) and another top chamber 3 for adjusting the hardness of a back of the head support (not shown).

**[0067]** The pillow 1 could also in another embodiment of the invention be provided with multiple separate bottom chambers 2.

**[0068]** The invention has been exemplified above with reference to specific examples of a pillow comprising means to adjust the pillows height and hardness. However, it should be understood that the invention is not limited to the particular examples described above but may be designed and altered in a multitude of varieties within the scope of the invention as specified in the claims.

List

**[0069]**

- 5 1. Pillow
2. Bottom chamber
3. Top chamber
4. Section
5. Hole
- 10 6. Section wall
7. Top wall in bottom chamber
8. Bottom wall in bottom chamber
9. Side walls in bottom chamber
10. Side wall in top chamber
- 15 11. Top wall in top chamber
12. Bottom wall in top chamber
13. Top surface
14. Inner layer
15. Outer layer
- 20 16. Relief valve
17. Bulb pump
18. Hose
19. Bulb
20. Direction valve
- 25 21. Pillow material
22. Outer casing
23. One-way valve
24. Top chamber dividing wall
- L. Longitudinal extend of pillow
- 30 W. Width of pillow
- H. Inflated height of pillow

**Claims**

- 35 1. A pillow (1) comprising at least one chamber (2) with means for adjusting the pillows (1) height (H) **characterized in that,**
  - 40 said pillow (1) comprises at least one further chamber (3) with means for adjusting the pillows (1) hardness wherein said at least one chamber (2) for adjusting the pillows (1) height (H) and said at least one chamber (3) for adjusting the pillows (1) hardness are placed vertically on top of each other, and wherein said means for adjusting the pillows (1) hardness and said means for adjusting the pillows (1) height (H) comprises at least one air pump (17) for inflating said chambers (2, 3).
- 45 2. A pillow (1) according to claim 1, wherein said means for adjusting the pillows (1) hardness and said means for adjusting the pillows (1) height (H) may be operated individually.
- 50 3. A pillow (1) according to claim 1, wherein said at least one air pump (17) is manually operated.

4. A pillow (1) according to any of the preceding claims, wherein said means for adjusting the pillows (1) hardness and said means for adjusting the pillows (1) height (H) comprises at least one externally or internally connected pressure relief valve (16) for deflating said chambers (2, 3).
5. A pillow (1) according to claim 4, wherein said at least one pressure relief valve (16) is manually operated.
6. A pillow (1) according to any of the preceding claims, wherein said pillow (1) has only one chamber (3) for adjusting the pillows (1) hardness and only one further chamber (2) for adjusting the pillows (1) height (H).
7. A pillow (1) according to any of the preceding claims, wherein said at least one chamber (3) for adjusting the pillows (1) hardness and/or said at least one chamber (2) for adjusting the pillows (1) height (H) are subdivided into more than one interconnected sections (4) e.g. a plurality of juxtaposed sections (4).
8. A pillow (1) according to claim 7, wherein said more than one interconnected sections (4) are formed as rectangular juxtaposed sections (4) each substantially extending in said pillows (1) entire longitudinal extent (L).
9. A pillow (1) according to claim 7 or 8, wherein said at least one chamber (3) for adjusting the pillows (1) hardness and/or said at least one chamber (2) for adjusting the pillows (1) height (H) are subdivided into between 1 and 20, preferably between 2 and 15 and most preferred between 4 and 8 interconnected sections (4).
10. A pillow (1) according to any of the preceding claims, wherein said at least one chamber (3) for adjusting the pillows (1) hardness and/or said at least one chamber (2) for adjusting the pillows (1) height (H) are formed substantially identically.
11. A pillow (1) according to any of the preceding claims, wherein said pillow (1) has a transverse extent (W) of between 200 and 1500 mm, preferably between 350 and 1100 mm, and most preferred between 500 and 850 mm.
12. A pillow (1) according to any of the preceding claims, wherein said pillow (1) has a vertical height (H) of between 10 and 400 mm, preferably between 35 and 280 mm, and most preferred between 70 and 160 mm when fully or substantially fully inflated.
13. A pillow (1) according to any of the preceding claims, wherein one or more kinds of pillow (1) material such as foam rubber, natural or synthetic fibres or other suitable materials, surrounds the two or more chambers (2, 3).
14. A pillow (1) according to any of the preceding claims, wherein said at least one chamber (3) for adjusting the pillows (1) hardness, said at least one chamber (2) for adjusting the pillows (1) height (H) and/or the different sections (4) of said chambers are made of material with different elasticity, respectively.
15. A pillow (1) according to any of the preceding claims, wherein said at least one chamber (3) for adjusting the pillows (1) hardness is placed on top of said at least one chamber (2) for adjusting the pillows (1) height (H).
16. A pillow (1) according to any of the preceding claims, wherein said at least one chamber (3) for adjusting the pillows (1) hardness is of a substantially constant volume independent of the pressure inside said at least one chamber (3).
17. A pillow (1) according to any of the preceding claims, wherein primarily the vertical extent, of said at least one chamber (2) for adjusting the pillows (1) height (H), change when the pressure inside said at least one chamber (2) change.
18. Use of a pillow (1) according to claims 1 to 17 for therapeutical purposes.

