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(71) Applicant: **Berghaus Limited**
London W1U 3PH (GB)

(72) Inventor: **Fish, Tim**
North Shields, NE30 1EF (GB)

(74) Representative: **Stoner, Gerard Patrick et al**
Mewburn Ellis LLP
York House
23 Kingsway
London WC2B 6HP (GB)

(54) **Rucksack**

(57) A rucksack having a hip support belt (52) pivotally attached to its frame (10) to permit user hip movement during walking. A flexible load-bearing rod (20), separate from the pivot attachment, is secured to the frame (10) and to each end of the hip support belt (52). In conjunction with the pivotable belt (52), the rod (20) is axially slidable relative to the frame (10) to allow complementary up-and-down movement of the user's hips whilst maintaining effective load transfer from the frame to the belt.

Shoulder cushion pads (82) are attached to a slidable yoke plate (70) whose slide extent is adjustable by a ratchet mechanism (34, 36) for different user back lengths. The ratchet mechanism is operable by the user whilst wearing the rucksack.

The shoulder cushion pads (82) are laterally adjustable on the yoke plate (70) for different user back widths.

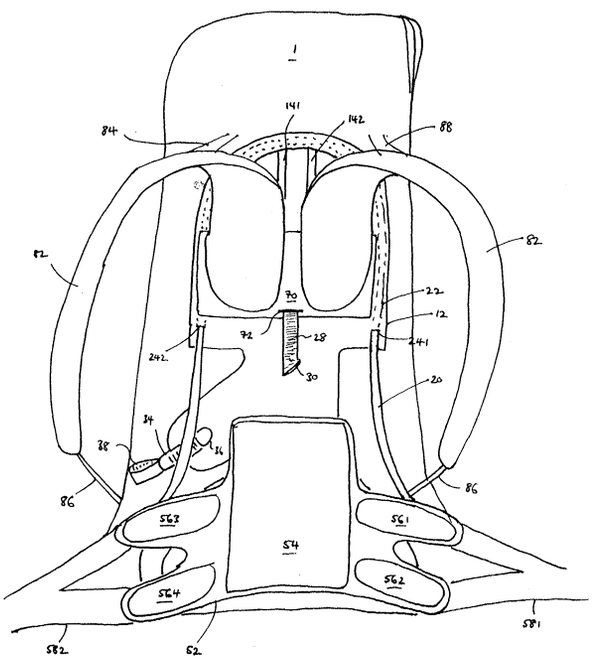

fig. 7

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Description

[0001] The present invention relates to a rucksack (or backpack) for use e.g. by a hiker to carry a load e.g. when walking. The invention particularly relates to rucksacks having hip belts which enable vertical load to be distributed on to the user's hips.

[0002] When rucksacks were first introduced, the only means for supporting them on a user were shoulder straps. This meant that the load of the rucksack acted only on the shoulders of the user, causing their centre of gravity to move backwards. To compensate for this, the user needed to lean forward when wearing the rucksack. Walking in a leaning position is awkward and tiring, so the user is more easily fatigued.

[0003] To solve the above problem, rucksacks were introduced which distributed the weight of the load more evenly on the user. One way of doing this was the introduction of hip fins. These were stiff preformed elements that were rigidly attached to the frame of the rucksack in a position where they would rest on the user's hips during use. The load of the rucksack was then transferred through the frame to both the user's shoulders and hips. Because the hips are at a lower point, this arrangement stabilised the user's centre of gravity.

[0004] However, a disadvantage of the rigid connection between the hip fins and the frame is that the rucksack acts as a splint to the human body, i.e. it interferes with free movement. For example, the natural movement of the user's hips during walking was transferred directly to the frame because of the rigid connection between hip fin and frame; moving was thus awkward because the load of the rucksack itself was moved by natural movement of the hips.

[0005] Many types of movement are affected by the rigid connection described above; walking and moving is therefore cumbersome and tiring. As mentioned above, walking causes motion of the hips. In addition, stepping upwards or downwards, turning the torso, and leaning forwards (e.g. to get a handhold when climbing) are all types of movement that cause the hips to move up and/or down, backwards and/or forwards, as well as in a twisting manner. Static hip fins solve the problem of load transfer but do not completely solve the problem of fatigue caused by moving when wearing a rucksack.

[0006] To solve the fatigue problem, it was thought desirable to introduce a hip fin system that would allow more natural movement of the hips. Rucksacks with separate hip belts that were pivotally attached to the remainder of the bag were introduced. The hip belts were generally a strip of rigid material (e.g. moulded plastic), perhaps with padding for comfort, that extended around the top of the user's hips. The lateral ends of the hip belt were intended to be equivalent to the hip fins of previous rucksacks. The pivotal attachment of the hip belt to the rucksack was made at the centre of the belt at the base of the rucksack, i.e. to allow the hip fin equivalents to rotate about a central point.

[0007] These rucksacks suffered from two major problems. Firstly, the pivoting motion sometimes caused the bag to be quite unstable. The whole bag could lean to one side with the user; since substantially all of the load was above the pivot point, over-balancing could easily occur. Secondly, the effectiveness of the hip fins in transferring load from the bag to the hips was reduced because the rigid connection between hip fin and frame had been removed. Now the load on the hips had to act through the pivot. Often the hip belt was relatively flexible with respect to the pivot, so in any event the hip belt could not support much load.

[0008] To tackle the first problem identified above, The North Face (TNF) launched their 'Pivotal' rucksack in July 2003. This rucksack is a development of the general type described above. The rucksack includes a main body comprising a frame secured to a flexible enclosure for holding a load. A spindle is supported by the frame and has a pivot member rotatably mounted on it. The pivot member is an elongate element comprising two lateral arms that extend away from the pivot point. A separate hip belt designed to be movable relative to the rest of the rucksack when in use is attached to the pivot member. This attachment is by two elongate arms, each of which extends from a flexible joint at a respective end of the pivot member to a position on a corresponding hip fin. In addition, a central arm extending from the frame is attached to a central point on the hip belt by a webbing strap such that when the bag is upright relative to the belt, the strap is in tension, but when the bag is leaning forward with respect to the belt, the strap is loose. In other words, the central arm allows extra support when the bag is upright.

[0009] To improve the movement of the hip belt with respect to the bag, TNF positioned the pivot higher than in previous rucksacks. Thus, instead of lying on an imaginary line drawn around the top of the user's hips, the pivot point is now positioned significantly higher up the spine. The rocking motion of the hip fins that is created by this pivot point is more natural, so the user feels less restricted and unstable than with previous packs.

[0010] A further advantage of a higher pivot is that more of the load of the bag is below the pivot point; this automatically improves stability.

[0011] However, the TNF Pivotal rucksack still retains the second disadvantage of the previous attempts, i.e. all of the load that is transferred to the hip fins must act through the pivot. This means that the spindle is subject to large loads, and the transfer of load is not efficient.

[0012] Previous rucksacks attempt to strike a balance between the ability efficiently to transfer load to a user's hips and the flexibility of movement afforded to the user. It is perceived that these are two opposing requirements; an increase in flexibility often results in a decrease in load transfer ability and vice versa.

[0013] The present invention aims to ameliorate at least some of the above mentioned problems, and desirably provides a rucksack that achieves both efficient

load transfer to the hips and flexibility of user movement.

[0014] At its most general, the present invention provides a rucksack with a direct load-bearing connection between the frame and a hip support that is separate from the movement (pivoting) mechanism of the hip support but flexible enough to permit movement of the belt in a tilting manner. The separation of pivot mechanism and load transferring mechanism allows the present invention to fulfil both the desirable requirements of a rucksack.

[0015] According to the present invention, there may be provided a rucksack having: a frame secured to a flexible enclosure for containing a load to be carried by a user; load support means for supporting the frame on the user, the load support means including a hip support for resting on the user's hips, the hip support being movable in a tilting manner relative to the frame to give the user freedom of movement when wearing the rucksack; load transfer means having left and right hip connections to transfer load from the frame respectively to left and right portions of the hip support, wherein the load transfer means includes a load-bearing flexible rod axially slidable along a load-bearing bent track defined on the frame, the rod having left and right ends at or connected to the left and right hip connections whereby the rod slides along the track to accommodate movement of the hip support in said tilting manner.

[0016] The hip support is therefore able efficiently to receive load from the frame without requiring intermediate parts (e.g. a spindle pivot or webbing strap as in the TNF Pivotal rucksack). Indeed, the direct transfer of load may occur whatever the relative position of the hip support and frame in use.

[0017] The load transfer means includes left and right connections that extend to a respective side of the hip support. The sides of the hip support (e.g. hip fins) are the sections through which most support can be gained, so providing the load transfer directly to the hip fins increases the transfer efficiency.

[0018] The invention describes a load-bearing rod, meaning an elongate element that can transfer force through both compression and tension.

[0019] Preferably, flexible load-bearing rod has a central region mounted on the frame and two ends, each end being secured at or to a respective side of the hip support, such that load acts from the frame directly through the load-bearing member onto the hip support. In other words, the rod is preferably integral with the left and right hip connections. The hip support may have hip fins e.g. formed or moulded of rigid plastic. They may have an integrally formed recess for receiving an end of the elongate member. Each end of the elongate member may be glued into a corresponding recess.

[0020] The frame has a load-bearing track structure in which the flexible rod is (axially) slidably received. The track may be integral with the frame, For example, the frame may include a rigid plastic frame sheet having an integrally moulded track structure. The flexible rod may therefore be mounted on the frame sheet. The frame sheet may be reinforced by metal (e.g. aluminium) struts.

[0021] The track structure may include rings or elongate tunnels (through which the rod may be threaded) e.g. integrally moulded in the frame sheet or a passageway or passageways (open or closed) to define a track for receiving the flexible rod.

[0022] The track is bent to direct the rod from one side of the hip support to the other. Preferably, the bend is gradual, e.g. arcuate, to achieve the correct balance between the flexibility and load-bearing properties of the rod. The track preferably crosses the frame, more preferably substantially fully from left to right to maximise the area from which load can be transferred.

[0023] The rod may loop in an inverted U on the frame. Preferably, the top of the loop, which receives the majority of the load transfer from the frame, is at the top of the frame sheet so that the member can take load from a large area of the frame.

[0024] In use, the rod is axially slidable on the frame preferably to allow complementary (i.e. equal and opposite) movement of the lateral ends of the hip support (e.g. hip fins) without reducing the overall load transfer. Thus, if the hips move up and down e.g. when walking, the member moves through its mounting on the frame to adjust accordingly. Thus, if one hip moves up and the other moves down, the length of member extending to the "up" hip decreases and the length of the member to the "down" hip increases accordingly. This means the load transfer remains effective to both hips; the "up" hip does not necessarily experience a gain in load due to its upward movement because of the compensating motion of the member.

[0025] Preferably, the rod has an unconstrained region between the central region and each end, the unconstrained region permitting flex (e.g. bend and twist) of the member to allow movement of the hip fins relative to the frame. The unconstrained regions allow a limited freedom of movement in addition to the complementary movement described above. Total freedom of movement is undesirable because the rucksack becomes too loose with respect to the user and may set as a cantilever to cause over-balancing. The present construction allows limited, i.e. controlled, freedom of movement to optimise the rucksack's efficiency.

[0026] Preferably, the member is made of a strong, smooth, flexible material such as an engineering plastics material, e.g. Delrin or the like. Most conveniently, the member has a rod form, e.g. cylindrical. It must be able to transfer axial load in compression.

[0027] Preferably, the hip support is pivotally mounted on the frame, the pivotal mount being independent of the load transfer means. The pivotal mount may therefore limit the lateral movement of the hip support. The pivotal mount may also limit the extent by which the hip support can move away from (out of the plane of) the frame. However, it is preferably merely a supplemental

movement restraint; the main transfer of force e.g. to the hip fins occurs by separate means.

[0028] Preferably, the pivot point is located centrally on the frame upwardly of an imaginary lateral axis extending between the hip fins, such that the lateral movement of the hip support relative to the frame is constrained to a rocking action where the hip fins move up and down in a complementary fashion during said lateral relative movement. The pivot point is therefore desirably located towards the mid-point of the spine, i.e. around 15cm or more above the imaginary line around the top of the hips.

[0029] Preferably, the hip support includes an upstanding central rigid part for pivotal mounting on the frame, the central rigid part being hingeably attached to the rest of the hip support. The hinge attachment may be affected by thickening the top portion of a one piece plate into order to encourage bending at the boundary of the thickening.

[0030] The hinged connection gives the pivot some flexibility during certain types of movement, e.g. leaning over. The hinged connection may be covered by a lumbar pad.

[0031] Preferably, the pivot point is movable relative to the frame. This may allow the pivot point to remain stationary with respect to the user when the bag is worn. This is very useful e.g. when the user leans forward so the load is hitched upwards and forwards with respect to the hips of the user. If the pivot point is unmoved, the effect on the user's hips is reduced.

[0032] Preferably, the pivot point is relatively movable in a vertical axis but constrained (preferably static) in a horizontal (lateral) axis. The pivotal mounting may be effected by a protruding boss receivable in a slot. To allow movement, the slot may be elongate in the direction of desired movement, e.g. along the spine. The slot may be moulded into the frame sheet.

[0033] Preferably, the load support means includes a pair of shoulder straps attached to the flexible enclosure. Each shoulder strap preferably has a cushion pad associated therewith to spread out the load on the user's shoulders. The cushion pads are preferably attached to a vertically slidable yoke plate mounted on the frame. The yoke plate is slidable to allow the rucksack to be adjusted for different back lengths. The cushion pads may be attached directly to the frame if the bag is intended for only one back length.

[0034] A human's back length is defined as the length of curvature of the spine from an imaginary line around the top of the hips to the C7 vertebra (i.e. the vertebra that sticks out most prominently when the head is tipped forward). Ideally, rucksacks are made for a certain back length. However, commercial outlets are unkeen to stock many sizes of the same bag, so adjustable back length rucksacks are called for.

[0035] The slide of the yoke plate may be adjustably limitable in order to vary the back length of the rucksack. Preferably a ratchet mechanism allows adjustment of the upper extent of the yoke plate slide.

[0036] Previous back length adjustment mechanism required the adjustment to be made whilst the bag was not being worn, e.g. because the mechanism itself was located in the centre of the back of the rucksack when worn. We propose an independently novel solution to this. The ratchet mechanism is pointed outwards and is operable using a pull strap that is accessible to the user even when that user is wearing the bag. Thus, according to this independent aspect of the invention, there is provided an adjustment mechanism for a rucksack, the rucksack having a frame secured to a flexible enclosure for holding a load to be carried by a user; shoulder support means for supporting the load on the shoulders of the user; and hip support means for supporting the load on the hips of the user, wherein the shoulder support means is adjustably movable relative to the hip support means to vary the back length of the rucksack, an adjustment mechanism for this including a retaining element engageable with the frame and/or hip support and/or shoulder support at a range of different retained positions corresponding to different spacings between the shoulder and hip supports, and a manual pull element connected to the retaining element for manual alignment of said spacing, wherein the manual pull element is exposed at a peripheral region of the frame, e.g. at a side thereof, so as to be accessible to the user even when the user is wearing the bag. The retaining element may engage with a corresponding retaining formation of the frame, e.g. a series of teeth or recesses on one engaging a pawl or complementary teeth on the other in a way that can be locked and-or is unidirectional.

[0037] In both aspects of the invention, the lateral separation of shoulder cushion pads may be adjustable. Preferably, the mounting of the cushion pads on the mounting plate is reversible. Preferably, the mounting is arranged such that relative rotation between the cushion pads and yoke plate is reduced or avoided.

[0038] An example of the present invention will now be described with reference to the accompanying drawings, in which:

Fig. 1 shows a frame sheet for a rucksack which is an embodiment of the invention;

Fig. 2 shows a front view of a lumbar cradle for connection to the frame sheet of Fig. 1;

Fig. 3 shows a side view of the lumbar cradle of Fig. 2;

Figs. 4a and 4b show front and back views respectively of a yoke slider for connection to the frame sheet of Fig. 1;

Figs. 5a and 5b show side and back views respectively of a shoulder cushion pad for connection to the yoke slider of Figs. 4a and 4b;

Fig. 6 shows a side view of a rucksack that is an embodiment of the invention; and

Fig. 7 shows a front view of the rucksack of Fig. 6.

[0039] Fig. 1 shows frame sheet 10, which is securely attached e.g. using stitching to the material that forms the enclosure part of the rucksack. The stitching is usually made all around the edge of plastic plate 12, which is made of strong, flexible material which allows, but restricts, flex. Plate 12 is formed by known injection moulding techniques. To reinforce plate 12, and provide the rigid structure of frame sheet 10, aluminium rods 141,142,143,144 are inserted into hollows 16 integrally formed in plate 12. A pair of rods 141,142 are located in an upright position at the top of the plate 12, whereas another pair of rods 143,144 are located in an angled, e.g. diagonal, position at the bottom of the plate 12. To save material and to reduce weight, gaps 181,182,183 are formed in plate 12 at the location of the rods 141,142,143,144, i.e. at the position wherein reinforcement in the plate 12 itself is not required because it is provided by the aluminium rods.

[0040] A Delrin rod 20 is threaded through an inverted U-shaped passageway 22 that is integrally formed in the top part of the plate 12. The Delrin rod 20 is longer than the length of the passageway 22 so that its ends extend out of the two entrances 241,242 to the passageway 22. The ends of the Delrin rod 20 are for attachment to a separate lumbar cradle 50; the load carried in the rucksack is then able to be transferred to the lumbar cradle 50 via the top surface of the passageway 22 acting on the Delrin rod 20.

[0041] An important feature of the embodiment is that the Delrin rod 20 is slidable within the passageway 22. Thus, the two ends of the Delrin rod 20 may be at different heights, e.g. due to the orientation of the lumbar cradle 50, but they will still both transfer load as efficiently as if the system was symmetrical.

[0042] The plate 12 has a through hole 26 provided towards its centre to receive a boss 60 protruding from the back of the lumbar cradle 50. The through hole 26 restricts movement of the boss 60 in the lateral direction. The relative movement of the lumbar cradle 50 and frame sheet 10 are therefore limited. The lateral relative movement permitted by the through hole 26/boss 60 combination is a rocking motion of the lumbar cradle 50. This mimics the natural motion of the hips. The position of the through hole 26 is chosen to be higher up the user's spine than the imaginary line moving around the top of the hips, i.e. the pivot point of the lumbar cradle 50 is located above the small of the back. The pivot point is positioned between a quarter and a third of the distance along the spine from the imaginary line running around the top of the hips to the C7 vertebra, e.g. 15-20cm up the spine from the pelvis.

[0043] The middle part of plate 12 contains a second passageway 32 which extends between aperture 30 located centrally on the plate 12 and a ratchet 36. A toothed strip 34 is engaged with the ratchet 36 and receivable in the passageway 32 so that the length of the strip 34 that protrudes from the passageway 32 is adjustable. The outer end of strip 34 is attached to a manual pull strap 38. The inner end of strip 34 is attached to webbing strap 28 which is threaded through aperture 30 to be attached to a yoke slider 70.

[0044] Yoke slider 70 is shown in Figs. 4a and 4b. It is made of rigid plastics using e.g. injection moulding. An aperture 72 is provided at a central location for securely receiving the webbing strap 28. The back of yoke slider 70 is provided with axial curved indents 74 which snap fit onto aluminium rods 141,142 of frame sheet 10. The snap fit is such that the yoke slider 70 can slide up and down on the aluminium rods 141,142. The extent of the slide upwards is limited by the length of the webbing strap 28. Thus, the manual pull strap 38 can be used to adjust the position of the yoke slider 70 on the frame sheet 10.

[0045] Each of the lateral ends of the yoke slider 70 contains a plurality of through holes 76. The shoulder cushion pads 82 of the rucksack are attached to the yoke slider 70 via a mounting plate 80 with a pair of protruding bosses 78. The shoulder strap assembly is shown in Figs. 5a and 5b. A plurality of through holes 76 are provided so that the lateral separation of the cushion pads 82 is adjustable. A pair of bosses 78 are provided to prevent relative rotation between the cushion pads 82 and the yoke slider 70, thereby increasing the stability of the rucksack.

[0046] As the shoulder cushion pads 82 are attached to the yoke slider 70, adjustment of the manual pull strap 38 causes adjustment of the back length of the bag. The strap 38 is accessible to the user even when the user is wearing the bag.

[0047] Figs. 2 and 3 show the lumbar cradle 50. The cradle 50 comprises a central pad to fit on the user's lumbar and two side fins for fitting on the user's hips. The cradle 50 includes a semi-rigid (i.e. firm but flexible) plate 52. The boss 60 for fitting into through hole 26 of the frame sheet 10 protrudes from the back of the plate 52. The plate 52 also includes an integrally formed hollow 62 in each of the side fins. Waist straps 581,582 extend away from each of the side fins and are fastenable around the user in the known manner.

[0048] The lumbar cradle 50 has a number of cushion pads to increase the comfort of the user. A lumbar cushion pad 54 fits on the small of the user's back and finger cushion pads 561,562,563,564 extend along the side fins for fitting on the user's hips.

[0049] Figs. 6 and 7 shown an assembled rucksack with a flexible enclosure 1 attached to the frame sheet 10. The shoulder cushion pads 82 are attached to the enclosure 1 using straps 84,86,88.

[0050] The lumbar cradle 50 is attached to the frame plate 10 via boss 60 and Delrin rods 20. The exposed parts of the rods 20 are flexible to allow relative movement between the lumbar cradle 50 and flexible enclosure 1.

[0051] The through hole 26 is elongate in the upright direction, which allows the flexible enclosure 1 to move relative to the lumbar cradle 50 e.g. when the user leans

over whilst wearing the bag.

[0052] Furthermore, the lumbar cradle 50 may flex about a lateral axis to allow further flexibility when the user bends over. A built-up section 53 on the plate 52 is used to encourage the lumbar cradle 50 to hinge at a certain point.

[0053] The skilled person will understand that the invention as set out in the claims can be worked in ways other than those specifically described in the embodiment.

Claims

1. A rucksack having:

a frame (10) secured to a flexible enclosure (1) for containing a load to be carried by a user;
load support means (50, 82) for supporting the frame (10) on the user, the load support means (50, 82) including a hip support (50) for resting on the user's hips, the hip support (50) being movable in a tilting manner relative to the frame (10) to give the user freedom of movement when wearing the rucksack;
load transfer means (20) having left and right hip connections to transfer load from the frame (10) respectively to left and right portions of the hip support (50),

characterised in that the load transfer means (20) includes a load-bearing flexible rod axially slidable along a load-bearing bent track (22) defined on the frame (10), the rod having left and right ends at or connected to the left and right hip connections whereby the rod slides along the track (22) to accommodate movement of the hip support (50) in said tilting manner.

2. A rucksack according to claim 1, wherein the load transfer means (20) includes flexible portions located between the track (22) and the left and right portions of the hip support (50).

3. A rucksack according to claim 2, wherein the flexible rod is integral with the left and right hip connections and the flexible portions are provided by portions of the rod extending between the track (22) and the left and right portions of the hip support (50).

4. A rucksack according to any preceding claim, wherein the track (22) is integral with the frame (10).

5. A rucksack according to any preceding claim, wherein the track (22) includes one or more elongate tunnels through which the flexible rod is threaded.

6. A rucksack according to any preceding claim, wherein the track (22) extends in an arc across the frame (10).

7. A rucksack according to any preceding claim, wherein the track (22) is arranged to constrain the flexible rod in an inverted U on the frame.

8. A rucksack according to any preceding claim, wherein the hip support (50) makes a supplemental restraint engagement with the frame (10) in addition to the left and right hip connections.

9. A rucksack according to claim 8, wherein the hip support (50) includes a central lumbar region for fitting against the user's back, and two side fins for resting on the user's hips, the central lumbar region including an upwardly extending portion that is pivotally mounted on the frame (10) at a pivot point located centrally on the frame (10) upwardly of an imaginary lateral axis extending between the side fins.

10. A rucksack according to claim 9, wherein the upwardly extending portion is hingeably attached to the rest of the central lumbar region to permit the user to bend forwards.

11. A rucksack according to any one of claims 8 to 10, wherein the hip support (50) is pivotally mounted on the frame (10) via a protruding boss (60) slidably receivable in a slot (26).

12. A rucksack according to any one of the preceding claims including a yoke plate (70) slidably mounted on the frame (10), wherein the load support means (50, 82) includes a pair of shoulder straps (82) attached to the flexible enclosure (1), each shoulder strap (82) also being attached to the yoke plate (70).

13. A rucksack according to claim 12, wherein the extent of the yoke plate slide is adjustably limitable in order to vary the back length of the rucksack.

14. A rucksack according to claim 12 or 13, wherein the extent of the yoke plate slide is adjustable by a ratchet mechanism (34, 36) operable using a pull strap (38) that is accessible to the user when the user is wearing the rucksack.

15. A rucksack according to any of claims 12 to 14, wherein attachment of the shoulder straps (82) on the yoke plate (70) provides for variable lateral separation of the straps (82).

16. A rucksack according to any of claims 12 to 15, wherein the mounting of each shoulder strap (82) is effected by a pair of bosses (78) receivable by and constrained within a pair of holes (76).

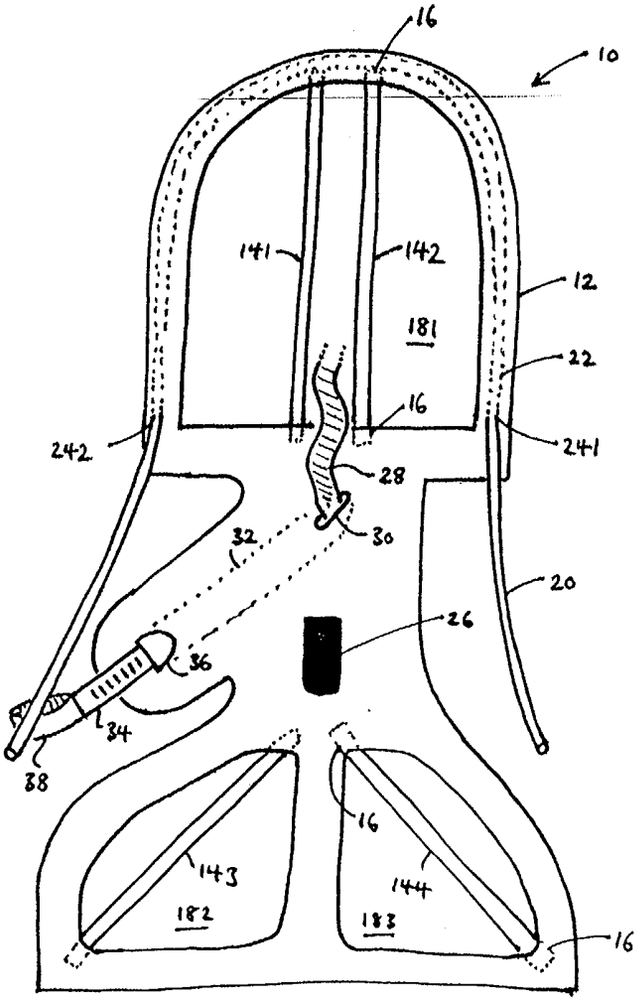
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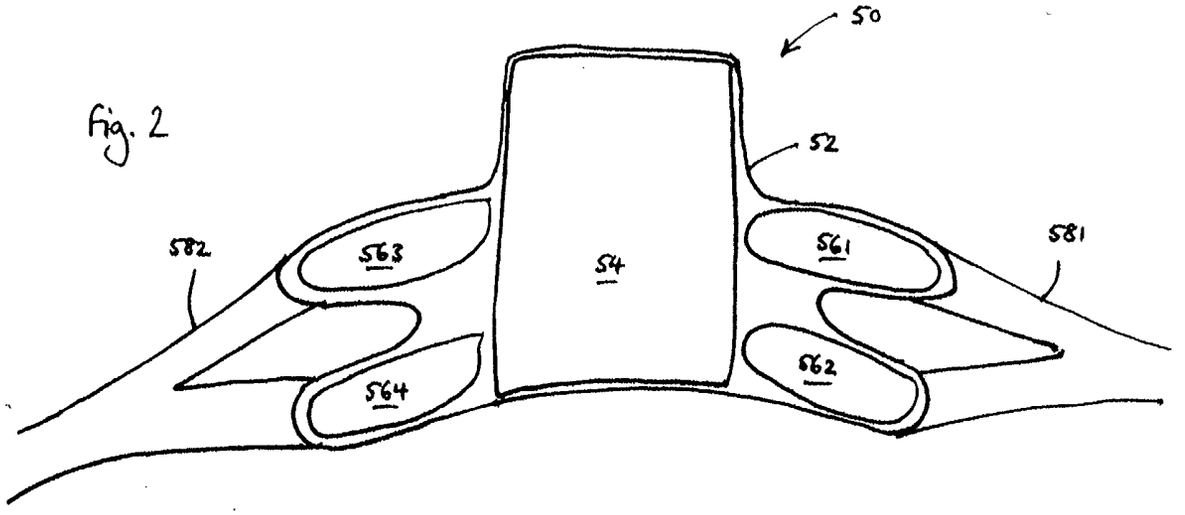
Fig. 1

Fig. 2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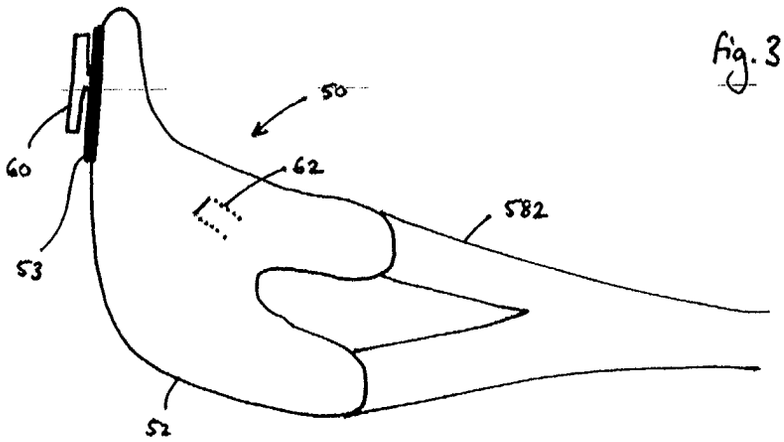

Fig. 3

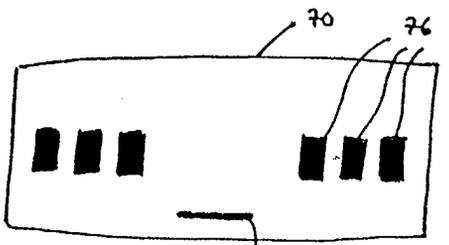

Fig. 4a

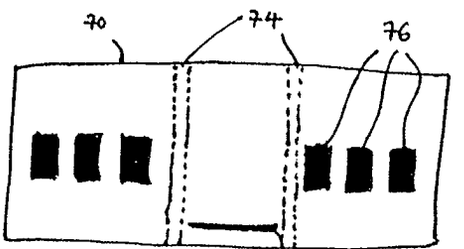

Fig. 4b

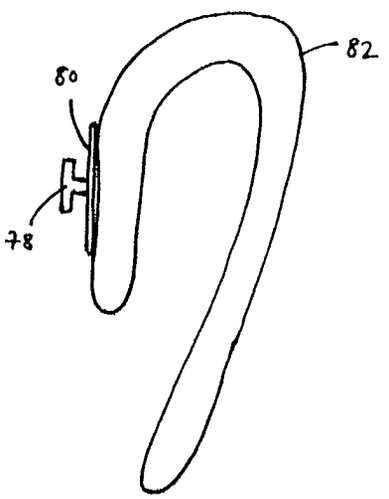

Fig. 5a

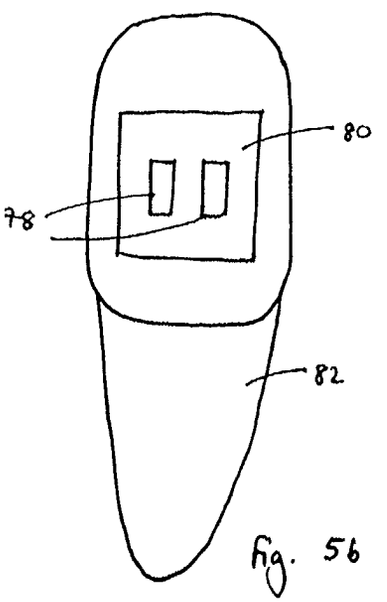

Fig. 5b

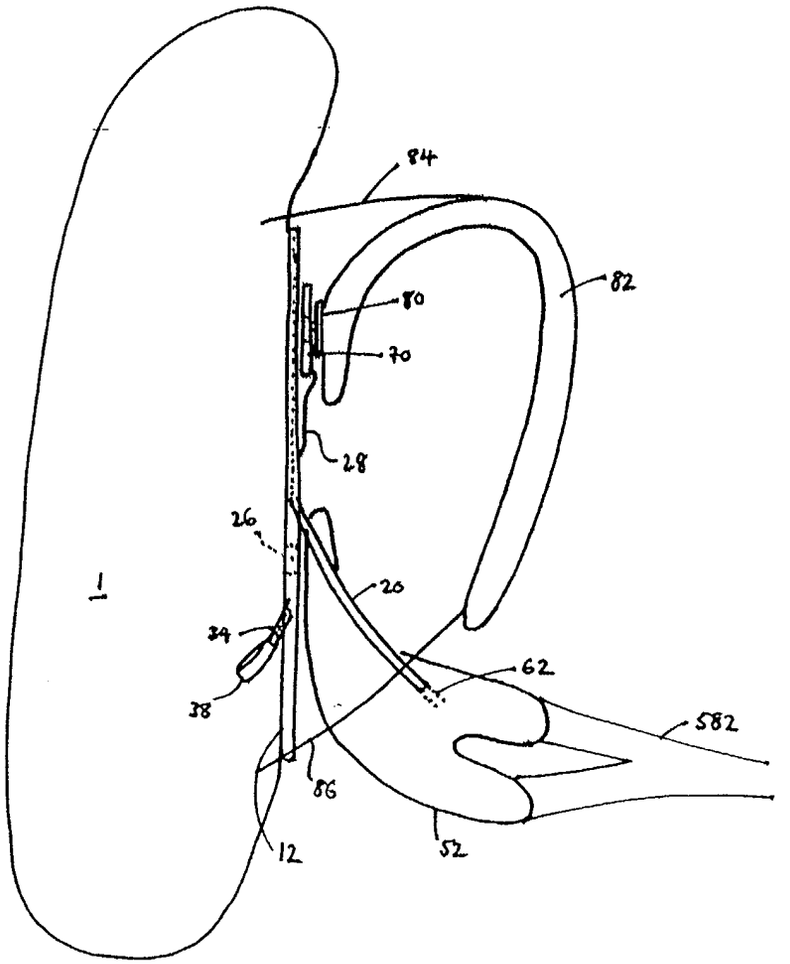

fig. 6

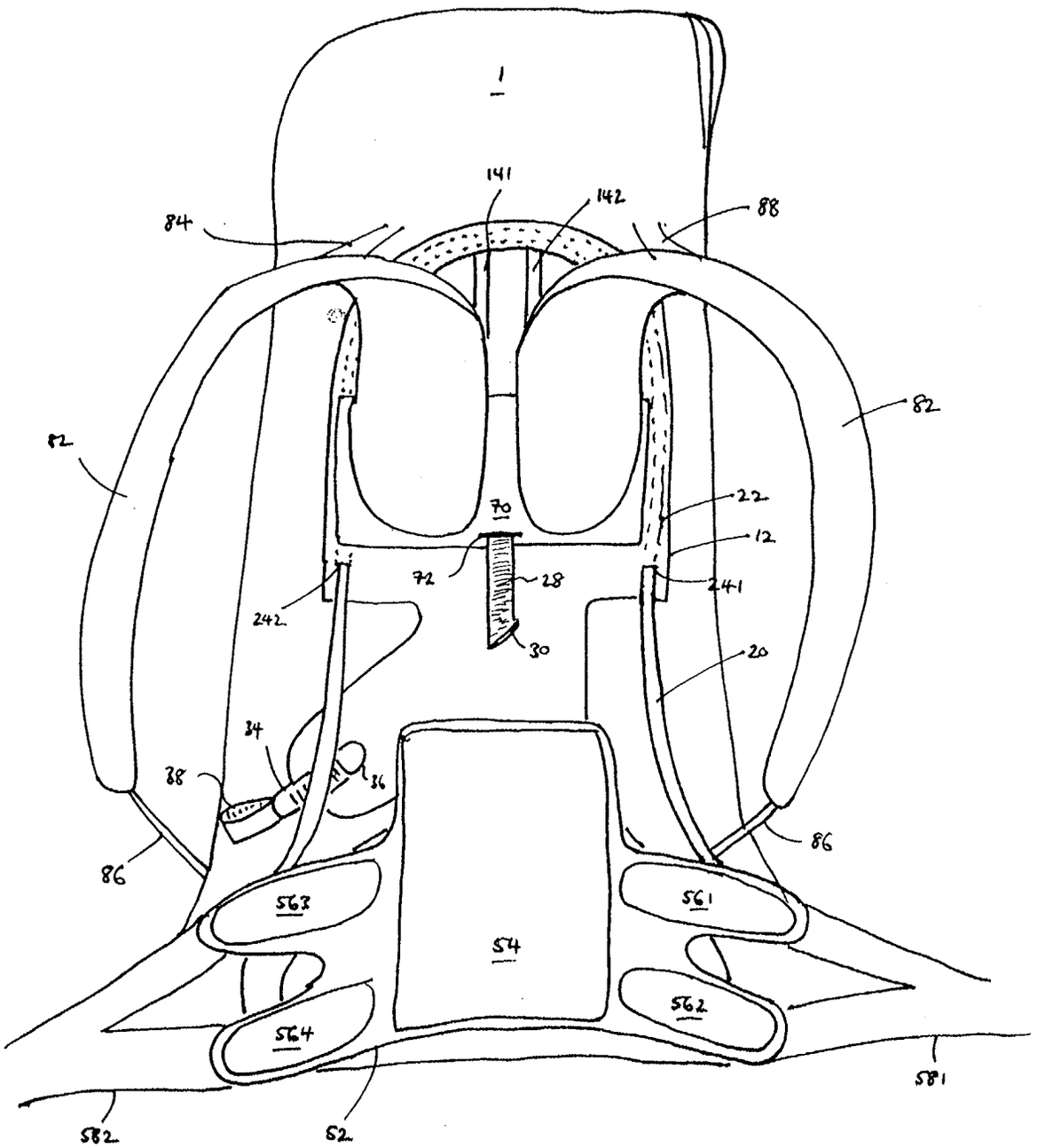
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fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 05 25 3407

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 5 090 604 A (HOWE) 25 February 1992 (1992-02-25) * figures *	1	A45F3/04 A45F3/08
P,A	WO 2004/082426 A (THE NORTH FACE APPAREL CORP) 30 September 2004 (2004-09-30) * page 6, line 7 - line 20 *	1-8, 11-16	
A	US 204 066 A (MERRIAM) 21 May 1878 (1878-05-21) * figures *	1	
A	US 6 024 265 A (CLEMENTS) 15 February 2000 (2000-02-15) * figures *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

A45F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 October 2005	Coniglio, C

CATEGORY OF CITED DOCUMENTS

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17-10-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5090604 A	25-02-1992	NONE	
WO 2004082426 A	30-09-2004	NONE	
US 204066 A		NONE	
US 6024265 A	15-02-2000	AT 180637 T	15-06-1999
		AU 2705797 A	05-12-1997
		DE 29723060 U1	05-03-1998
		DE 69700254 D1	08-07-1999
		DE 69700254 T2	30-12-1999
		DE 873065 T1	06-05-1999
		EP 0873065 A1	28-10-1998
		WO 9742851 A1	20-11-1997
		IE 71158 B2	29-01-1997

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