(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
20 January 2005 (20.01.2005)

PCT

(10) International Publication Number
WO 2005/004668 A1

(51) International Patent Classification[7]: A45F 3/04, 3/08, 3/10

(21) International Application Number: PCT/NZ2004/000151

(22) International Filing Date: 15 July 2004 (15.07.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
527022 15 July 2003 (15.07.2003) NZ

(71) Applicant *(for all designated States except US)*: **MACPAC WILDERNESS EQUIPMENT LIMITED** [NZ/NZ]; 11 Moncur Place, Riccarton, Christchurch (NZ).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **GOULDING, John, Stuart** [CA/CA]; 307-1701 Powell Street, Vancouver, British Columbia V5L 5C9 (CA). **MORIARTY, Carl, Francis** [NZ/NZ]; 8-1 Wiggins Street, Sumner, Christchurch (NZ).

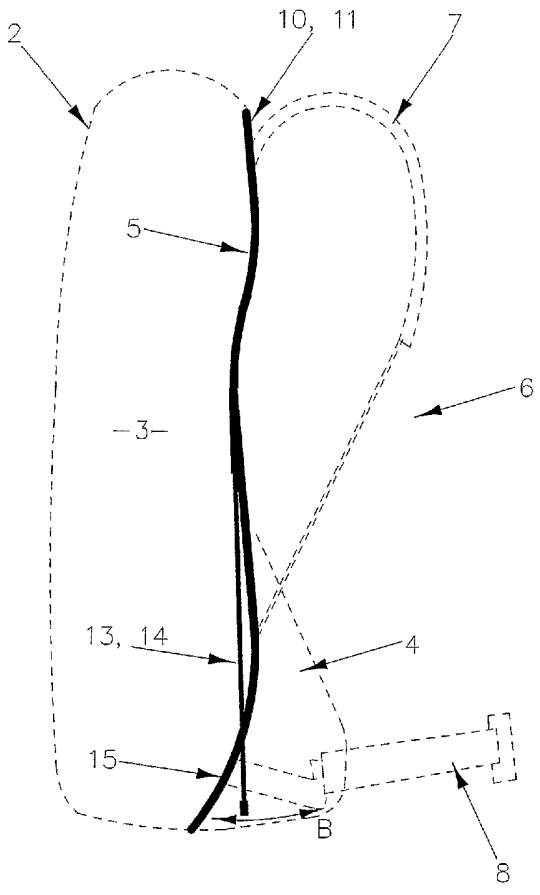
(74) Agent: **BUCHANAN, Elspeth, Victoria**; 61 Cambridge Terrace, (P.O. Box 1250), Christchurch (NZ).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH,

[Continued on next page]

(54) Title: IMPROVED PACK AND FRAME FOR PACK



(57) Abstract: A pack which includes a sac, an internal frame for the sac, a shoulder harness and a hip belt; the frame includes a pair of spaced flexible rods positioned one on each side of the frame so as to extend down at least the lower part of the length of each side of the sac; tensioning means are secured between each flexible rod at or adjacent the end of said flexible rod, and an adjacent portion of the hip belt; each said tensioning means being adapted to move the corresponding flexible rod so as to bow and tension said rod and provide a relatively rigid weight transmitting connection between said rod and the corresponding portion of the hip belt; the arrangement being such that said movement of said flexible rods tends to lift the frame and the pack, decreasing the loading on the shoulder harness and increasing the loading on the belt.

WO 2005/004668 A1

GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Title: Improved Pack and Frame for Pack

Technical Field

The present invention relates to improvements in climber's or tramper's packs, and to frames for such packs.

Background Art

A modern pack consists of a sac in which equipment may be carried, the sac being mounted on a frame, and a shoulder harness secured to the sac or to the frame. Since carrying a heavy load supported only from the shoulders can lead to backache or even to back damage, a majority of modern packs also include a hip belt which is connected to the sac or the frame, generally at or close to the base of the sac, to transfer some of the load from the shoulders to the hips.

Although using a hip belt reduces the strain on the back, the belt itself can cause problems to the wearer, due to the way in which the human body moves when walking.

When a human being walks, he leans backwards and forwards with each step (Fig. 1) and from side to side with each double step (Fig. 2). As he leans to the supporting side when taking a step the torso compresses on that side and extends on the stepping side (Fig. 3):- this means that, viewing the person from the front, the person's hips pivot up and down around an imaginary centre line (indicated in broken lines in Fig. 3). This is termed 'up and down' movement in the present specification. In addition, as shown in Fig. 4, the person's hips move with his legs, but his torso and arms swing in the opposite direction, with the body pivoting at the waist. In Fig. 4, a line through the shoulders is indicated by line S-S and a line through the hips is indicated by line H-H. As shown in Fig. 4, there is a considerable relative rotation between the shoulders (line S-S) and the hips (line H-H) with each step. This is termed 'twisting' movement in the present specification.

Also, when a human being bends or steps up, his back extends:- the further the person

leans forwards, the longer his back becomes. This extension of the back is in a curved plane, following the natural curve of the back.

Because of the above described movements, a hip belt which is rigidly secured to the pack, and which therefore moves with the pack, is very uncomfortable for the wearer, because the hip belt is constantly rubbing against the wearer due to the relative movements of different parts of the wearer's body when walking. The hip belt cannot be loosened to prevent this rubbing, because the belt must fit snugly to transmit load to the wearer's pelvic girdle and relieve the load on his back. Fig. 5 of the accompanying drawings shows, in diagrammatic form, the effect of a person wearing a pack with a rigidly-secured hip-belt bending forwards;- the back extension raises the pack and lifts the hip-belt from the hips, applying uncomfortable pressure across the front of the lower abdomen (arrow P).

The above described problem was partially solved by the pivotal hip belt connection provided by New Zealand Patent No. 201751 (Macpac Wilderness Equipment Limited) dated 25th July 1983.

However, the hip belt described in New Zealand patent No. 201751 was not a complete solution to the problem:- because the hip belt was secured to the pack by a comparatively narrow connection, the load transfer from the pack to the hip belt was concentrated at the connection point and was distributed around the pelvic girdle of the wearer only by the stiffness of the hip belt. The more rigid the hip belt, the better the load transfer, but in general, the more rigid a hip belt is, the less comfortable it is to wear. Thus, the problem remained of providing a harness which permitted relative movement between the wearer's back and hips in at least three directions but which provided an efficient load transfer around the pelvic girdle of the wearer without resorting to the use of an uncomfortably stiff hip belt.

New Zealand Patent 335931 provides a frame and hip belt which give excellent weight transfer, but both the frame and the hip belt are bulky and thus comparatively heavy to wear, and are relatively expensive to manufacture.

PCT Application PCT/US97/13396 discloses a backpack frame which also is designed to overcome the problem of efficient weight transfer; this frame consists of an elastomeric pad combined with a pair of spaced resilient rods which extend down the

back of the pad and which can be flexed to a greater or lesser extent by tightening or slackening the hip belt of the pack. However, the degree of fixing of the resilient rods, and hence the amount of load transfer to the hip belt, depends upon the tightness of the hip belt:- there is no provision for altering the amount of load transfer independent of the tightness of the hip belt. In practice, it is often desirable to be able to alter the amount of load transfer to the hip belt without actually tightening the hip belt. Further, increased flexing of the resilient rods tends to pull the pack load closer to the user's back, but does not necessarily lift part of the load from the shoulder harness.

Disclosure of Invention

It is an object of the present invention to provide a pack and a pack frame which are comparatively lightweight and thus simpler from a user's perspective, whilst also providing efficient and easily altered weight transfer from the pack to the hip belt.

The present invention provides a pack which includes a sac, an internal frame for the sac, a shoulder harness and a hip belt;
wherein the frame includes a pair of spaced flexible rods positioned one on each side of the frame so as to extend down at least the lower part of the length of each side of the sac;
and wherein tensioning means are secured between each flexible rod at or adjacent the end of said flexible rod, and an adjacent portion of the hip belt; each said tensioning means being adapted to move the corresponding flexible rod so as to bow and tension said rod and provide a relatively rigid weight transmitting connection between said rod and the corresponding portion of the hip belt; the arrangement being such that said movement of said flexible rods tends to lift the frame and the pack, decreasing the loading on the shoulder harness and increasing the loading on the belt.

Brief Description of Drawings

A preferred embodiment of the present invention is described in detail with reference to the accompanying drawings, in which:-

Fig.s 1-5 are diagrams showing the movement of the human body when walking;
Fig. 6 is a plan view of a pack frame in accordance with the present invention;
Fig. 7 is a side view of the frame of Fig. 6;

Fig. 8 is a diagrammatic side view of the frame of the present invention fitted into a pack;

Fig. 9 is a detail of Fig. 8 on a larger scale;

Fig. 10 is a section on line X-X of Fig. 9, on a larger scale; and

Fig. 11 is a diagrammatic side view of part of the frame fitted into a pack, in accordance with a second embodiment of the present invention.

Best Mode for Carrying out the Invention

Referring in particular to Fig. 8, a climber's or tramper's pack 2 in accordance with the present invention comprises a sac 3 which is of known type (apart from the addition of wings 4 as hereinafter described) which is supported by an internal frame 5 and which is provided with a harness 6 which includes a pair of padded shoulder straps 7 and a hip belt 8. The harness 6 is of known type apart from the novel features of the hip belt as described below.

Referring in particular to Fig.s 6 and 7, the frame 5 consists of a pair of spaced U-shaped portions 10, 11 which are inclined at an acute angle to each other and are spaced apart by a crossbar 12. The curved end of each U-shaped portions 10,11 is uppermost, and when the frame is inserted into the sac 3, the U-shaped portions support the upper part of the sac.

The outer leg 10a, 11a of each U-shaped portion is connected to a flexible rod 13,14, the longitudinal axis of which is aligned with the longitudinal axis of the corresponding leg.

The inner leg 10b, 11b of each U-shaped portion is formed integrally with a looped portion 15 which supports the lower portion of the sac and lies between the flexible rods 13,14.

The outer and inner legs 10a/b, 11a/b are tied together adjacent their lower ends by crossbars 10c,11c.

As shown in Fig. 7, each of the U-shaped portions 10,11 is curved in side view to accommodate the curve of a wearer's upper back, and the looped portion 15 also is curved to accommodate the shape of the wearer's lower back.

The frame 5 is secured inside the sac 3 in known manner, as shown in Fig. 8.

The sac 3 is of known design apart from the addition of a fabric wing at each lower rear corner of the sac. Each wing 4 is roughly triangular in shape, and includes two parallel pieces of fabric with padding sandwiched between them.
As shown more detail in Fig. 9, the side 4a of the wing which extends along the length of the back of the sac opens into that portion of the sac which receives the frame 5, and the corresponding flexible rod 13,14 lies within the wing 4, between the layers of padding.

Two parallel openings 16,17 into the interior of each wing 4 are formed in the outer edge 4 c (.e. furthest from the edge 4a), adjacent the lower edge 4b.

Each opening 16, which is closest to the edge 4c, receives one end 18 of the hip belt 8; the end 18 passes through the width of the wing 4 and is sewn to the sac adjacent the opening 16.

Each opening 17 receives an adjustment strap 19 which extends through the opening 17 and is secured at its inner end to the corresponding flexible rod 13,14 adjacent the lower end of the rod. Each strap 19 is secured to the corresponding flexible rod 13,14 by means of a retainer 20 formed integrally with the rod. The outer end 21 of each adjustment strap 19 passes through a buckle 22 which is secured to the hip belt 8. For reasons of clarity, the buckle 22 is shown in Fig.s 9 and 10 as a simple 2- bar buckle, but in fact is an adjustment buckle of known type which allows each strap 19 to be pulled through the buckle in the direction of Arrow A (Fig. 10) but does not permit movement in the reverse direction until the strap 19 is manually repositioned to allow reverse movement.

The above described pack is used as follows:- the pack is positioned on the wearer's shoulders in the usual way, and the hip belt is buckled around the wearer's hips. In the untensioned position shown in Fig. 9, the frame 5 is attached to the hip belt 8 by the wings 4 and the straps 19, all of which are free to flex and pivot relative to the frame:- this results in a flexible connection, but with relatively little weight transferred from the frame to the hip belt.

To increase the proportion of the weight of the pack which is transferred from the frame to the hip belt, the wearer pulls the straps 19 in the direction of Arrow A, pulling the flexible rods 13,14 in the direction of Arrow B. The adjustment buckles 22 hold the straps 19 in the bowed, i.e. tensioned, position, retaining the flexible rods 13,14 in the position shown in hatch lines (14a in Fig. 9). This provides a much more rigid attachment between the frame and the hip belt, and thus improves weight transfer to the hip belt.

Fig. 11 shows an alternative embodiment of the invention, in which the wing 4 is omitted from each side of the sac 3, and instead each side of the sac opens directly into the adjacent portion of the hip belt 8. In this embodiment, the end of each flexible rod 13,14 lies within the belt 8, and is tensioned by an adjustment strap 19a which extends through an opening 17a in the hip belt 8 and operates in the same manner as the adjustment strap 19 described with reference to the first embodiment: the same reference numerals indicate the same components as described with reference to the first embodiment.

The pack of the present invention is capable of providing efficient weight transfer to the hip belt, but is substantially simpler to manufacture and lighter in weight than comparable designs.

Claims

1. A pack which includes a sac, an internal frame for the sac, a shoulder harness and a hip belt;
wherein the frame includes a pair of spaced flexible rods positioned one on each side of the frame so as to extend down at least the lower part of the length of each side of the sac;
and wherein tensioning means are secured between each flexible rod at or adjacent the end of said flexible rod, and an adjacent portion of the hip belt;
each said tensioning means being adapted to move the corresponding flexible rod so as to bow and tension said rod and provide a relatively rigid weight transmitting connection between said rod and the corresponding portion of the hip belt; the arrangement being such that said movement of said flexible rods tends to lift the frame and the pack, decreasing the loading on the shoulder harness and increasing the loading on the belt.

2. The pack as claimed in claim 1, wherein said frame is a skeleton frame made of rod or bar.

3. The pack as claimed in claim 1 or claim 2, wherein the frame consists of a pair of spaced U-shaped portions inclined at an acute angle to each other and secured together, and spaced apart, by one or more crossbars, the inner legs of said U-shaped portions being secured together by a looped portion, and the outer leg of each U-shaped portion being secured to one of said flexible rods.

4. The pack as claimed in any one of the preceding claims, wherein each tensioning means comprises a strap secured at or adjacent the end of the corresponding flexible rod, the other end of said strap extending through an adjustment buckle.

5. The pack as claimed in any one of the preceding claims wherein the end of each flexible rod lies within a wing formed upon the lower side portion of the sac.

6. The pack as claimed in any one of claims 1 – 4, wherein the end of each flexible rod lies within the hip belt.

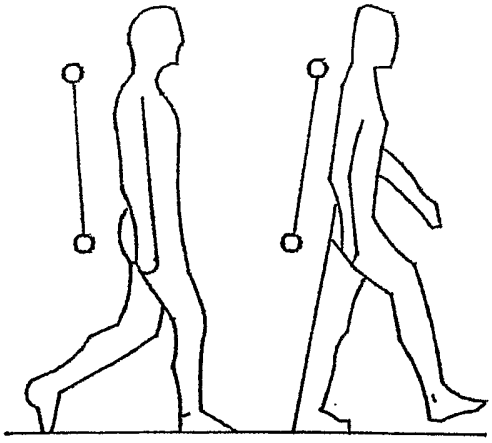


Fig.1.

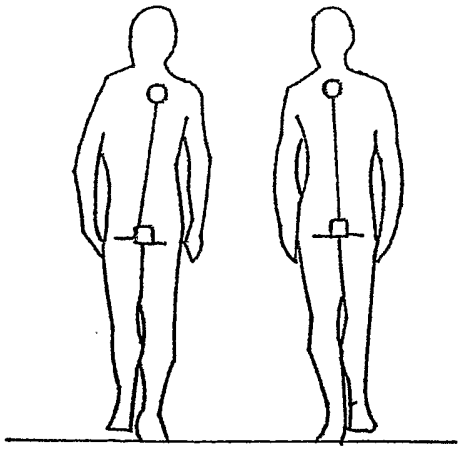


Fig.2.

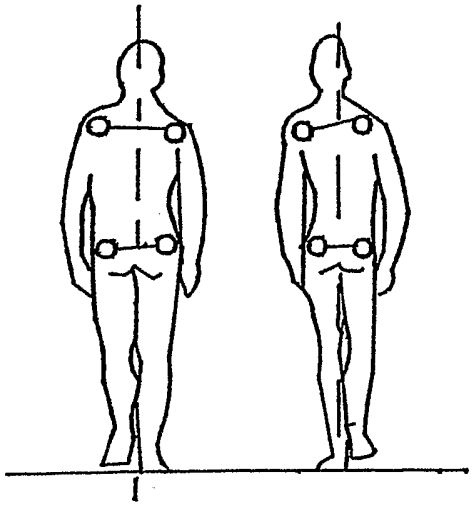


Fig.3.

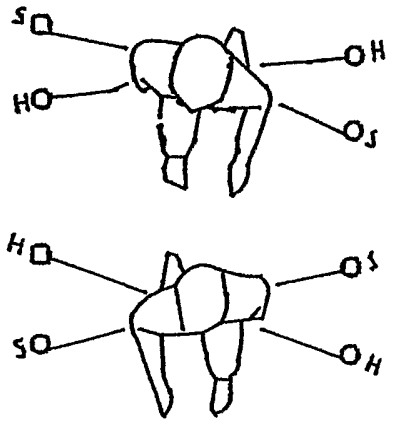


Fig.4.

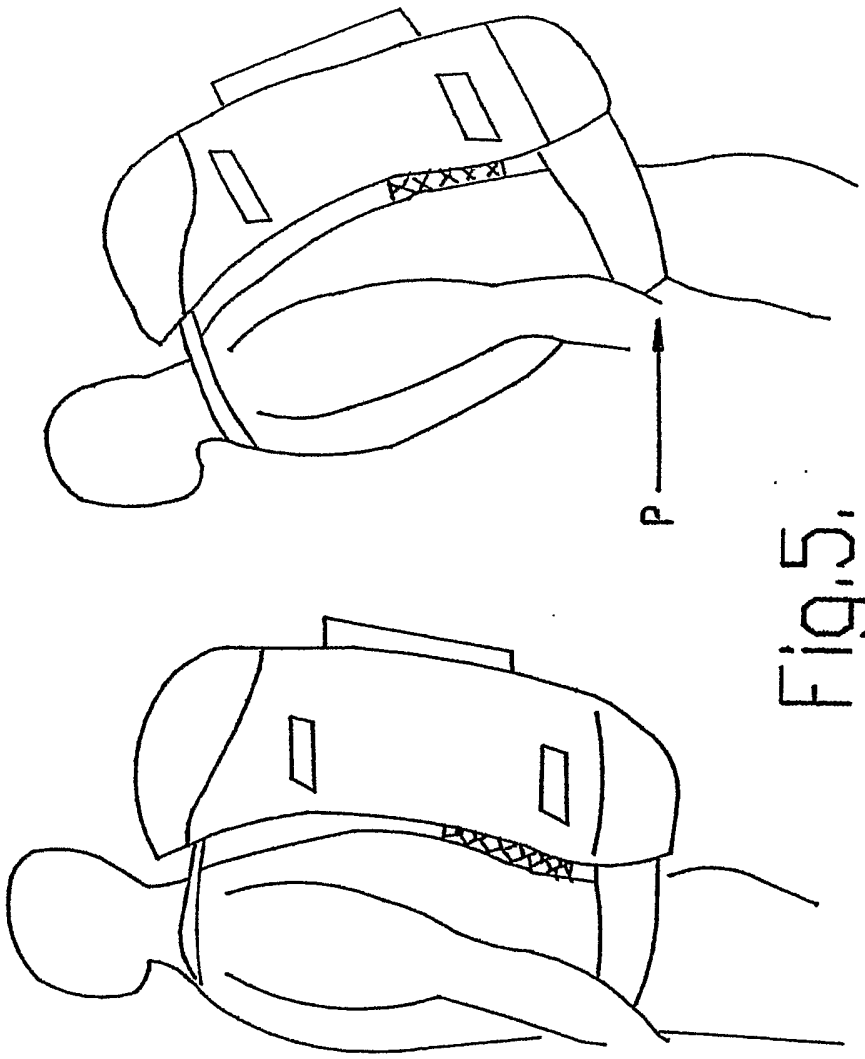


Fig.5.

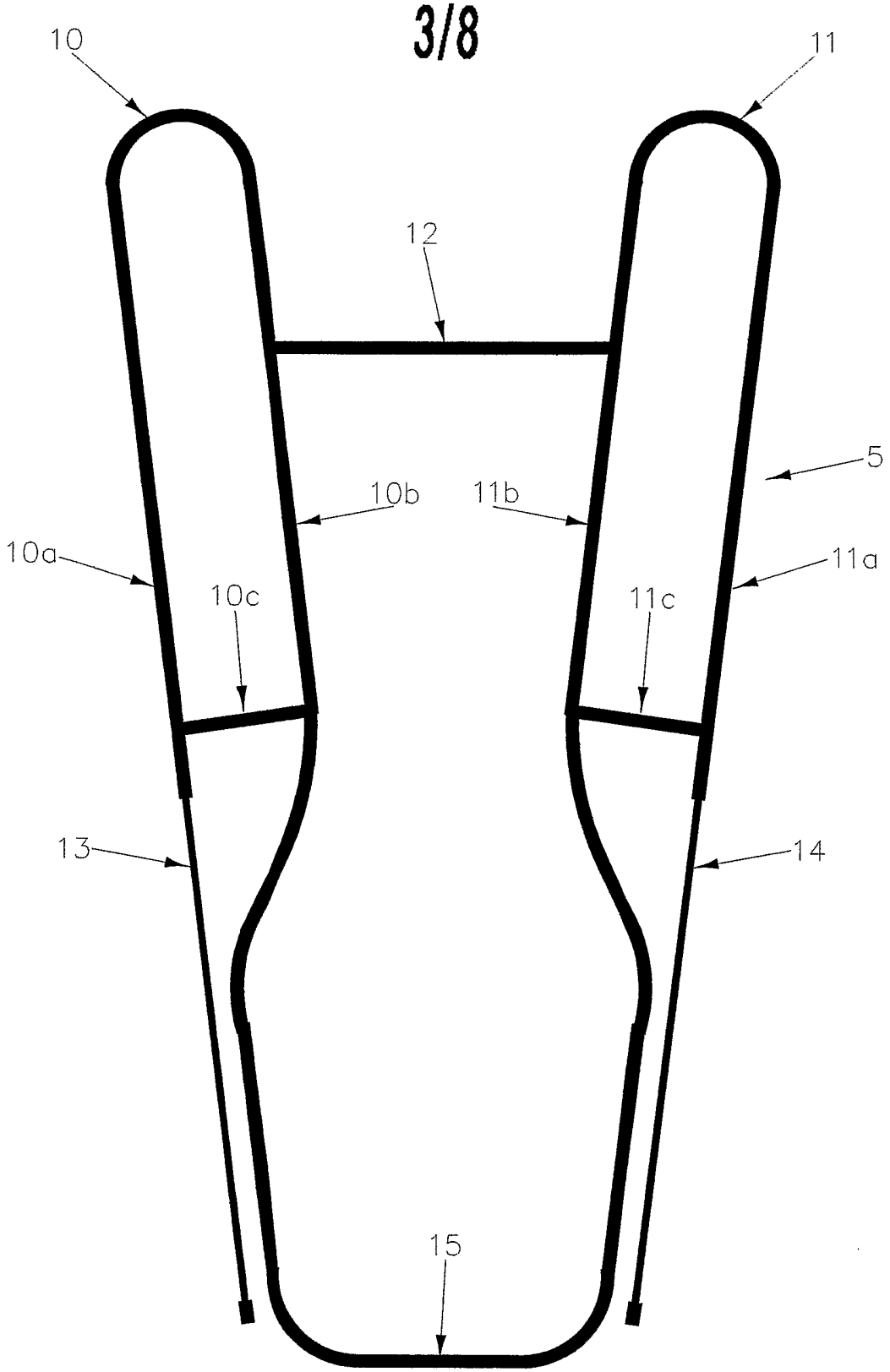


Fig.6

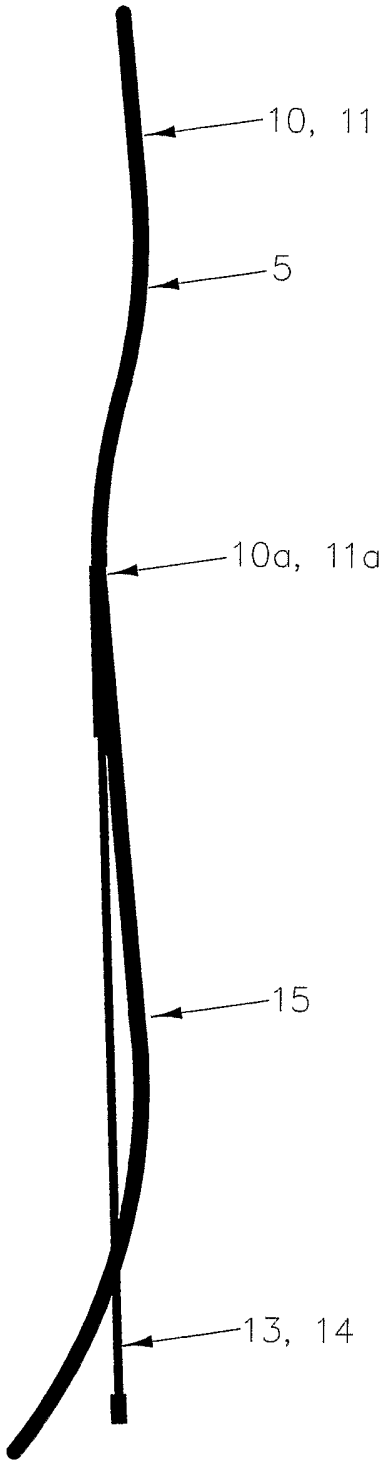


Fig. 7

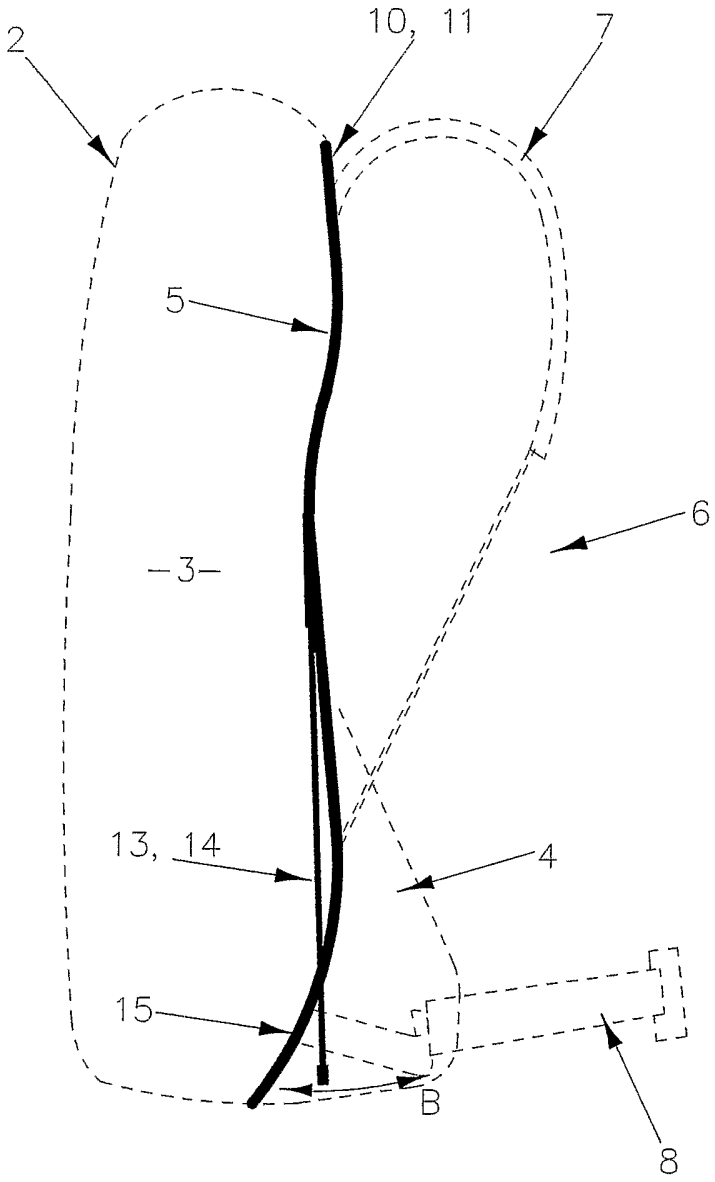


Fig.8

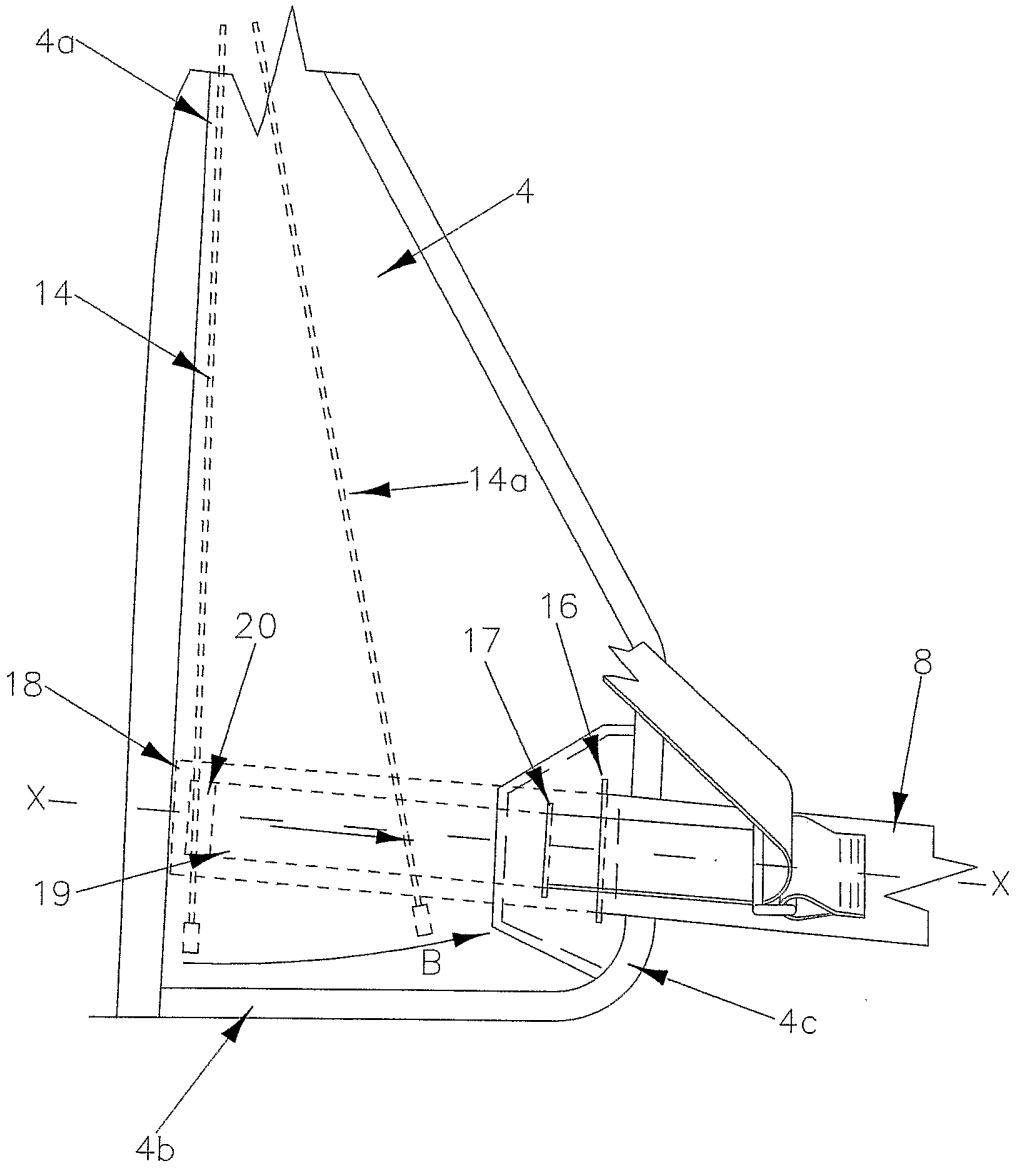


Fig. 9

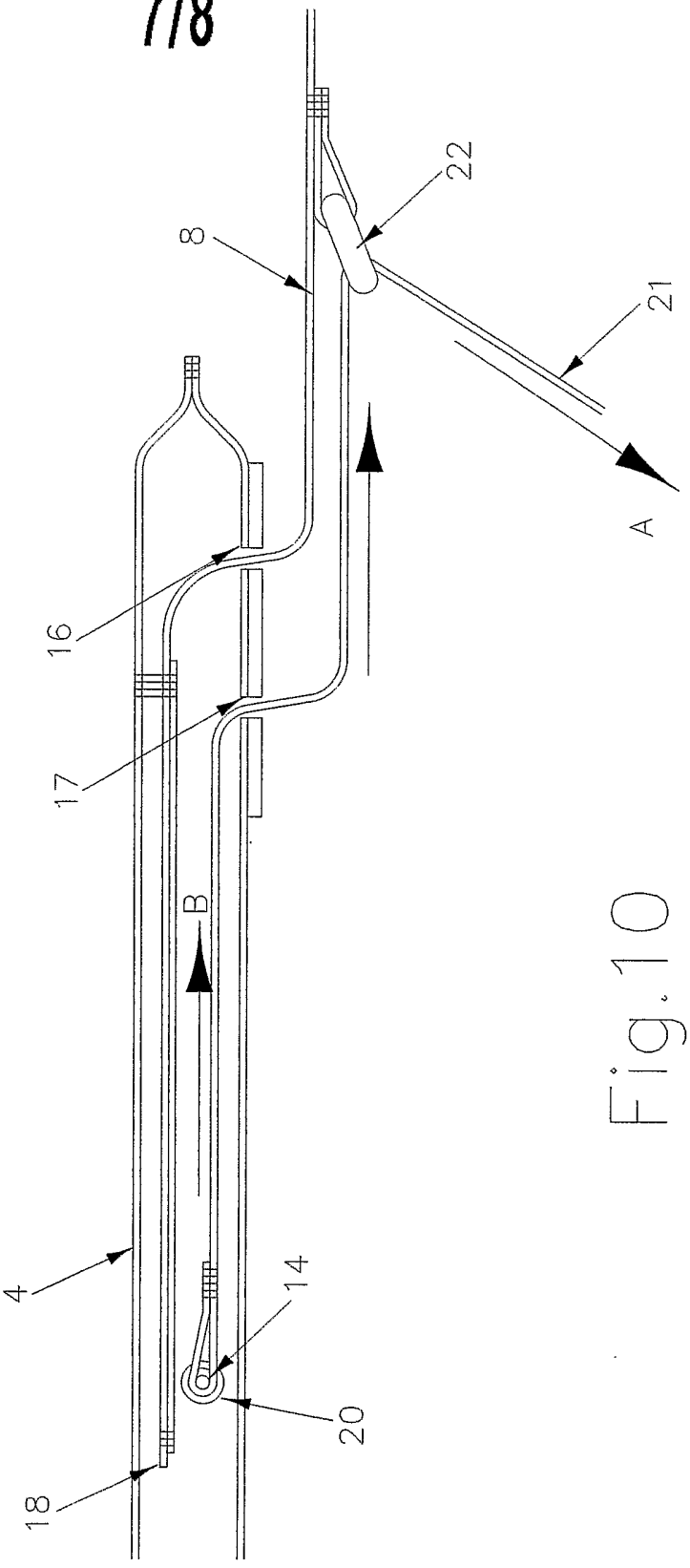


Fig. 10

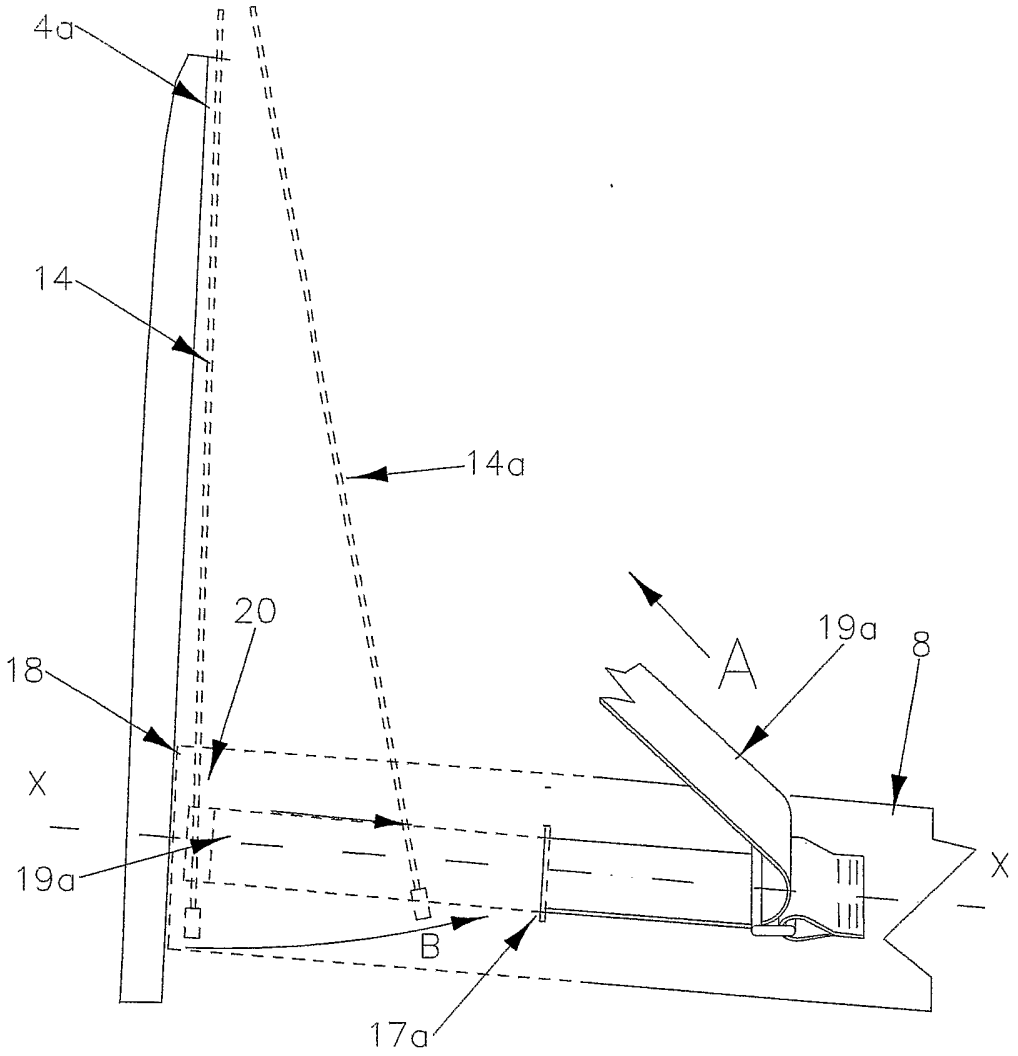


Fig.11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ2004/000151

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: A45F 3/04, 3/08, 3/10

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
DWPI: IPC(7) Class Marks A45F 3/04, 3/08, 3/10 + Keywords (Frame, Rod, tube, elongate, flexible, resilient, move)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	WO 1998/006297 A (DANA DESIGN LTD), 19 February 1998	
X	Figures	1,2,4-6
A		3
	US 5090604 A (HOWE), 25 February 1992	
A	Figures	1-6
	EP518485 B (KARRIMOR INTERNATIONAL LIMITED), 6 March 1996	
A	Figures	1-6
	EP104538 B1 (SCHAFER), 20 January 1988	
A	Figures	1-6
	NZ 335931 A (MACPAC WILDERNESS EQUIPMENT LTD), 9 November 2000	
A	Figures	1-6
	NZ 201751 A (MACPAC PRODUCTS (NZ) LTD) 31 May 1985	
A	Figures	1-6

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 September 2004	23 SEP 2004
Name and mailing address of the ISA/AU	Authorized officer
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	**G.B. NATH** Telephone No : (02) 6283 2126

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ2004/000151

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 1987/000013 A (MASCHINENVERTRIEB KOHLBRAT & BUNZ GmbH), 15 January 1987 Figures	1-6
A	US 2002/0170932 A1 (HIGGINS et al), 21 November 2002 Figures	1-6

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/NZ2004/000151

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

Patent Document Cited in Search Report		Patent Family Member					
WO	9806297	AU	39002/97	CA	2261672	US	5890640
US	5090604		NONE				
EP	0518485	IE	921498	NZ	242685		
EP	0104538	AU	19698/83	US	4479595		
NZ	201751	US	4504002				
WO	8700013	AT	192585	CA	1265769	CN	86104369
		DD	251494	EP	0308397	FI	875072
		HU	46201	NO	870815	SU	1718707
		US	4871101				
US	2002170932		NONE				
NZ	335931	AU	36351/00	US	6276584	GB	2350286