



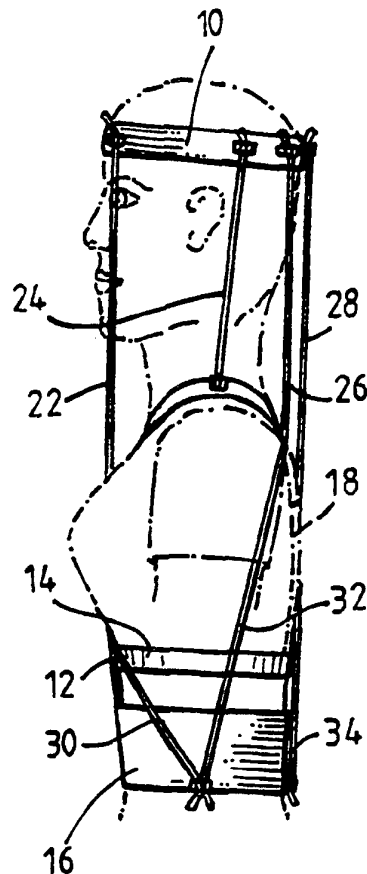
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification⁵ : A63B 23/025, 21/055</p>	<p>A1</p>	<p>(11) International Publication Number: WO 94/20171 (43) International Publication Date: 15 September 1994 (15.09.94)</p>								
<p>(21) International Application Number: PCT/US94/02636 (22) International Filing Date: 11 March 1994 (11.03.94)</p> <p>(30) Priority Data:</p> <table border="0"> <tr> <td>029,874</td> <td>11 March 1993 (11.03.93)</td> <td>US</td> </tr> <tr> <td>134,800</td> <td>12 October 1993 (12.10.93)</td> <td>US</td> </tr> <tr> <td>08/208,991</td> <td>10 March 1994 (10.03.94)</td> <td>US</td> </tr> </table> <p>(71)(72) Applicant and Inventor: MILLER, Bruce, W. [US/US]; 1100 Pinellas Bayway, Tierra Verde, FL 33715 (US).</p> <p>(74) Agent: CAGLE, Stephen, H.; Arnold, White & Durkee, P.O. Box 4433, Houston, TX 77210 (US).</p>	029,874	11 March 1993 (11.03.93)	US	134,800	12 October 1993 (12.10.93)	US	08/208,991	10 March 1994 (10.03.94)	US	<p>(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, LV, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TT, UA, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
029,874	11 March 1993 (11.03.93)	US								
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(54) Title: ISOTONIC CERVICAL EXERCISE DEVICE

(57) Abstract

An apparatus for exercising the muscles surrounding the cervical spine of a person in an isotonic manner, comprising: a head band (10) adapted to fit around the person's head; a breast plate (12); a back plate (18); at least one strap adapted to hold the breast plate and back plate in position on the person's body; a belt (14) adapted to fit around the person's lower torso and lower back, wherein in the belt (14) is coupled to the breast plate (12) or back plate (18); a lumbar belt (16) adapted to fit around the person's waist; a plurality of adjustable elastic straps (22, 24, 26, 28) adapted to provide tensile loads between the head band (10) and the breast and back plates (12, 18); and a plurality of adjustable elastic straps (30, 32, 34) adapted to provide tensile loads between the breast and back plates (12, 18) and the lumbar belt (16).



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ISOTONIC CERVICAL EXERCISE DEVICE

The subject invention relates generally to exercise devices and, more particularly, to medical implements designed to strengthen, support, and rehabilitate neck muscles surrounding the cervical spine and provide support for the back. The device of this invention is a functional assemblage of components arranged to universally fit patients or other users. The individual components can be assembled into multiple embodiments.

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A variety of exercise and medical devices have been used in the past to exercise or rehabilitate the neck or spine of individuals. Typically, such devices are used by individuals recuperating from accidents, e.g., automobile or athletic. The prior art devices can generally be characterized as cumbersome, unattractive, and ineffective. The use of such devices has been hampered by the requirement that movement and activity while such devices are worn is extremely limited.

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The isotonic device of this invention solves these prior art problems by providing a device that is worn during normal activity and that achieves its therapeutic benefits during such routine use. The device of this invention has utility both as an exercise device and as a medical device for isotonic treatment of the neck and cervical spine area. The device of this invention simultaneously provides exercise, support and recuperative ability.

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One of the known devices used in the prior art for exercising the human neck, involves the use of a series of straps of cloth material which are sewn or otherwise secured together to form a hat-like pocket for cradling the head of the person whose neck is to be exercised. Portions of the straps are arranged to depend from the hat portion of this prior art device so as to extend substantially below the neck and shoulders of the person performing a neck exercise routine but not, typically, below the waist of such user. The ends of such straps terminate in loops for anchoring suitable weighted objects thereto.

The use of this prior art neck exercising device involves placing the hat portion over the head of the person whose neck is to be exercised, affixing one or more weighted objects to the looped portions of the depending straps and thereafter moving the neck up and down and side to side. The weighted objects provide a constant pull or "force" which is transmitted to the user's neck via the depending straps and the hat structure formed by the sewn straps. The neck is thereby exercised along with the muscles of the human body which are associated with the movement of the human neck. At least one deficiency with this prior art device lies in the inability of the user to comfortably stand up and exercise his neck; the contact of the weighted objects with his body is in some cases intolerable and in other cases, simply a nuisance and a source of irritation.

Another prior art neck exercising device includes an upright frame capable of surrounding the upper torso of a person. This device includes: a pair of handles manual gripping of the frame, a plurality of weighted objects, and some flexible ropes. One end of each rope is secured to one of the weighted objects. The device further includes guide means secured to a frame for guiding each of the

plurality of ropes; means for securing the ropes to the weighted objects; and means for securing the unattached ends of the ropes to the head of the person using the device.

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The use of this prior art device relies on movements of the weights which are intended to strengthen the neck. This device, however, can present problems when used by patients with a herniated disc. The weights can cause additional compression of the cervical spine and therefore, possibly exacerbate the injuries of the cervical spine. In addition, the use of the frame is cumbersome and a nuisance.

At this time, there is a continuing need for a device for exercising the cervical spine as it relates to rehabilitation of injuries to the cervical spine, deformities of the cervical spine and disease of the spine affecting the neck area. There is also a need for strengthening soft tissues and ligamentous tissues, such as the anterior, posterior and left and right lateral longitudinal ligaments of the cervical spine. A device is especially needed when these areas have been exposed to trauma and injury has resulted. A device is also needed for those people suffering from a weakness in the cervical spine from other causes other than trauma. Especially needed is a device which can address the above needs while depending solely on isotonic responses (without weights) to natural movements, and allows the person to use the device while engaging in almost any type of activity. Such a device would be an improvement over the prior art and is described herein.

The present invention generally concerns a medical device for exercising the muscles surrounding the cervical spine of a person. In the broadest embodiment of the

medical device of this invention, an assemblage of elements including a cranial support means, front and back tension control means, a lumbar belt, a plurality of positioning straps, and a plurality of elastic straps are functionally interconnected to form the medical device of this invention. Optionally, a chin cup is interconnected to the tension control means. By adjusting the length of the elastic straps interconnecting the cranial support means to the front and back tension control means, the effective tension on the cervical spine area is changed so that the desired support or exercise is achieved.

One preferred embodiment of the invention comprises a breast plate; a back plate; a headband adapted to fit around a person's head; a belt adapted to fit around a person's lower torso lower back; a lumbar belt adapted to fit around a person's waist; a pair of straps wherein one strap extends over a person's left shoulder and connects the respective left upper portions of the breast and back plate, and one strap extends over a person's right shoulder and connects the respective right portions of the breast plate and back plate; and a plurality of elastic straps adapted to provide loads between a frontal portion of the headband and the breast plate and a posterior portion of the headband and back plate. Additionally, a plurality of elastic straps are adapted to provide tensile loads between the breast plate and lumbar belt and between the back plate and lumbar belt. Also in this embodiment, the lumbar belt is connected to the breast plate by a loop fastener means and a chin cup is optional.

FIG. 1 is a front view of a person wearing an embodiment of the invention in a neutral position.

FIG. 2 is a posterior view of a person wearing the embodiment of the device of Fig. 1 in a neutral position.

FIG. 3 is the corresponding side view of a person wearing the embodiment of the device of Fig. 1 in a neutral position.

5 While the invention is susceptible to various modifications and alternative forms, specific embodiments have been shown by way of example in the drawings and will be described in detail herein. However, it should be understood that the invention is not intended to be limited
10 to the particular forms disclosed. Rather, the invention is to cover all modifications, equivalents and alternatives following within the spirit and scope of the invention as defined by the appended claims.

15 The present invention is an isotonic cervical exercise device designed to create an isotonic movement of the cervical spine to strengthen the soft tissues, including ligamentous, muscle and other soft tissue connections affecting the cervical spine.

20 In its broadest application, the medical device of this invention includes a cranial support means, front and back tension control means, elastic straps connecting the cranial support means to the front and back tension control
25 means, a lumbar belt, positioning straps connecting the lumbar belt to the front and back tension control means and elastic straps connecting the lumbar belt to the front and back tension control means. The cranial support means is generally designated by the numeral 10 and in its most
30 preferred embodiment takes the form of a head band. Other more rigid structures are likewise useable. The purpose of the cranial support means 10 is to provide the cranial attachment for elastic bands connected to the portion of the apparatus surrounding the upper torso of the user.
35 Therefore, the cranial support means may take the form of any convenient head band or similar such structure. It is

necessary that cranial support device 10 have a plurality of connecting means for receiving one end of elastic straps connecting the cranial support means to the lower apparatus.

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In its most preferred embodiment, the medical device of this invention also includes front and back tension control means. The purpose of the tension control means is to provide attachment means on the user's body for the various elastic and positioning straps that are used to interconnect the components of the assembly of this invention. In one form, the front and back tension control members are hard plates with attachment sites for the elastic and inelastic straps of the invention. Front tension control means is generally designated by the number 12 and back tension control means is generally designated by the number 18. Both the front and back tension control means include receptive sites for elastic bands and inelastic positioning straps interconnecting with the cranial support means and the lumbar belt. In its most preferred embodiment, both the front and back tension control means are made from a hard plastic in a functionally effective shape to maintain the position of the portion of the apparatus strapped to the upper torso in comparison to the movement of the cranial support means engaged by the head of the user. Other forms and other materials are equally applicable to the front and back tension control means. In a most preferred embodiment, the front tension control means takes the form of a breast plate made of a hard plastic material with a cushioning material on the inside. Likewise, the back tension control means is made of a hard plastic material with a cushioning material likewise included.

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A third component of the assemblage of this invention is the lumbar belt 16. Lumbar belt 16 takes the form of

what are generally referred to as back support belts typically worn by workers whose duties include lifting of materials. The lumbar belts are typically four to ten inches in width and are made of leather or a synthetic material. The lumbar belts are structurally rigid to provide a firm anchor for the front and back tension control means and the cranial support means. In many instances, the lumbar belt has a buckle engagement means or a velcro engagement means. The size and shape of the belt can be custom designed to fit the particular user.

In connecting the cranial support means 10, front tension control means 12, back tension control means 18 and lumbar belt 16 are a series of elastic straps and inelastic positioning straps. These straps may take the form of elasticized tubing or flat elasticized cloth material or any other convenient form that permits the adjustment of tension. The first set of elastic straps connects the cranial support means 10 to the front and back tension control means 12 and 18. These straps are generally identified by the numerals 22, 26, and 28. A plurality of straps are necessary to connect the cranial support means to the front and back tension control means in order to provide isotonic tension for both front and back movement of the cranial area. Additional elastic straps are likewise preferred to provide isotonic tension for whatever direction the cranial area is moved. As mentioned previously, in one embodiment of the invention, these elastic straps take the form of rubberized tubing. However, this is not meant by way of limitation but merely by way of example. Other elasticized material may be used depending on the desired configuration and appearance of the final assembly product.

Similarly, elastic straps 32 are used to connect the lumbar belt to the front and back tension control means.

This interconnection provides additional tension and isotonic exercise to the cranial and cervical areas. The elastic straps are similar to those used to connect the front and back tension control means to the cranial support means. In each instance, it is necessary that the elastic strap be adjustable to accommodate different sizes of users and different desired tensions.

Positioning straps 36 are used to connect the front and back tension control means to the lumbar belt. These straps are not intended to be elastic although in certain embodiments they may be slightly elastic. The purpose of positioning straps 36 is to firmly anchor the front and back tension control means and to position said control means relatively firmly on the body of the user. In the most preferred embodiment of this invention positioning straps 36 are inelastic velcro straps attachable to lumbar belt 16.

In its most preferred embodiment the device generally comprises: a breast plate; a back plate; a head band adapted to fit around a person's head; a belt adapted to fit around a person's lower torso and back; a lumbar belt adapted to fit around a person's waist; a pair of straps adapted to extend over a person's shoulders and connect the respective right and left sides of the upper portions of the breast plate and back plate; and a plurality of adjustable elastic straps adapted to provide tensile loads between the head band and the breast and back plates, and between the lumbar belt and the breast and back plates.

The device operates in an isotonic manner. Each of the elastic straps are adjustable so that when the device is placed on a person, each strap is tightened to the point of resistance. The point of resistance is the amount of tension that occurs just prior to the point where a pulling

effect occurs. Thus, when the device is in operation, any movement caused by the person, such as anterior flexion, posterior extension, left and right lateral flexion or left and right rotation is affected by the restraint effect of the elastic straps, thereby accomplishing an isotonic type
5 of resistance for building of the soft tissue surrounding the spine.

This device is unique because it requires only the
10 movement of the cervical spine in a natural motion in order to achieve an isotonic response and thus strengthen the tissue surrounding the cervical spine. It achieves the foregoing result without the need of cumbersome weights. In addition, it does not depend on an isometric response,
15 which is a force against an unmovable source. Therefore, the device allows a person to engage in almost any type of activity while wearing (operating) the device, including, but not limited to, household activities and work activities, whether sitting, lying, standing or walking.

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Turning now to the drawings, Figure 1 is a front view of a person wearing an embodiment of the isotonic cervical exercise device in a neutral position. Figure 2 is a posterior view of a person wearing the embodiment of the isotonic cervical exercise device of Figure 1 in a neutral
25 position. Figure 3 is a side view of a person wearing the embodiment of Figures 1 and 2 in a neutral position.

Referring to Figures 1, 2 and 3, a head band 10 is
30 adapted to be secured around a person's head, and includes frontal and posterior portions corresponding to the respective sides of the person's body. A breast plate 12 is adapted to fit against the frontal side of a person's body. The breast plate 12 may further include a padding on
35 one side of the breast plate to act as a cushion between the breast plate 12 and the person's body. A belt 14 is

adapted to fit around the person's lower torso and lower back. The belt 14 is coupled to the breast plate or back plate.

5 A lumbar belt 16 is adapted to fit around a person's waist or lower torso and is releasably coupled to the breast plate or back plate. The lumbar belt 16 may provide back support to the person. In addition, the lumbar belt 16 acts as an anchoring mechanism for elastic straps. A
10 back plate 18 is adapted to fit against the posterior portion of the person's body. More particularly, the back plate 18 is adapted to fit against a person's back and may further include a padding on one side to act as a cushion between the back plate and the person's body.

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 A pair of straps 20 are adapted to hold the breast plate 12 and back plate 18 in position on the person's body. A first strap 20 is connected at one to the upper left portion of the breast plate 12, extends over the
20 person's left shoulder and is connected at the opposite end to the upper left portion of the back plate 18. A second strap 20 is connected at one end to the upper right portion of the breast plate 12, extends over the person's right shoulder, and is connected at the opposite end to the upper
25 right portion of the back plate 12.

 A plurality of adjustable elastic straps 22, 24, 26 and 28 are adapted to provide tensile loads between the head band 10 and breast plate 12, back plate 18 and straps
30 20. In this embodiment, a pair of adjustable elastic straps 22 provide tensile loads between the right and left frontal portions of the head band 10 and the right and left upper portions of the breast plate 12, respectively; a pair of adjustable elastic straps 24 are adapted to provide
35 tensile loads between the right and left posterior portions of the head band 10 and the right and left straps 20,

respectively; a pair of adjustable elastic straps 26 are adapted to provide tensile loads between the right and left posterior portions of head band 10 and the right and left upper portions of the back plate 18, respectively; and an adjustable elastic strap 28 is adapted to provide a tensile load between the middle posterior portion of the head band 10 and the middle portion of back plate 18.

Also in this embodiment, a plurality of adjustable elastic straps 30, 32 and 34 are adapted to provide tensile loads between the breast plate 12 and the lumbar belt 16, and between the back plate 18 and the lumbar belt 16. More particularly, a pair of adjustable elastic straps 30 are adapted to provide tensile loads between the right and left upper portions of the breast plate 12 and a right and left portion of the lumbar belt 16, respectively. Additionally, a pair of adjustable elastic straps 32 are adapted to provide tensile loads between the upper right and left portions of back plate 18 and the right and left portions of the lumbar belt 16, respectively. Also in this embodiment, a pair of adjustable elastic straps 34 are adapted to provide tensile loads between right and left portions of back plate 18 and the right and left portions of lumbar belt 16, respectively.

An embodiment of this invention may include an optional chin cup adapted to fit around a person's chin. The chin cup may be held in place on the person's chin by one or more adjustable elastic straps adapted to provide tensile loads between the right and left sides of the chin cup and the head band. In addition, one or more adjustable elastic straps may be adapted to provide tensile loads between the chin cup and the straps 20, breast plate 12, belt 14 or lumbar belt 16.

CLAIMS

1. A medical device for isotonic treatment of the musculature of the cervical spine comprising:
- 5 (a) cranial support means adapted to removably engage the cranial area of a user;
- (b) front and back tension control means functionally connected to said cranial support means by one or
10 more elastic straps;
- (c) a lumbar belt adapted to adjustably fit around said user's waist or lower torso;
- 15 (d) a plurality of positioning straps adjustably connecting said lumbar belt to said front and back tension control means, said positioning straps maintaining said front and back tension control means in relatively fixed position; and
- 20 (e) a plurality of elastic straps adjustably connecting said lumbar belt to said front and back tension control means.
- 25 2. The medical device for isotonic treatment of the musculature of the cervical spine of claim 1 wherein said cranial support means comprises a head band with a plurality of attachment means for said elastic straps.
- 30 3. The medical device for isotonic treatment of the musculature of the cervical spine of claim 1 wherein said front tension control means comprises a breast plate.
4. The medical device for isotonic treatment of the musculature of the cervical spine of claim 1 wherein said
35 back tension control means comprises a back plate.

5. The medical device for isotonic treatment of the musculature of the cervical spine of claim 1 wherein said device further comprises a chin cup.

5 6. The medical device for isotonic treatment of the musculature of the cervical spine of claim 5 further comprising at least one elastic strap adapted to provide tensile loads between the chin cup and the breast plate, lumbar belt or other portion of the apparatus of claim 5.

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7. The medical device for isotonic treatment of the musculature of the cervical spine of claim 1 wherein said positioning straps are inelastic.

15 8. The medical device for isotonic treatment of the musculature of the cervical spine comprising:

(a) a cranial support means adapted to removably engage the cranial area of a user, said cranial support means having a plurality of attachment means for elastic straps;

20

(b) front and back tension control means functionally connected to said cranial support means by one or more elastic straps, said front and back tension control means taking the form of front and back hard plates;

25

(c) a lumbar belt adapted to be adjustable around said users waist or lower torso, said lumbar belt including a plurality of attachments for elastic and inelastic straps;

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(d) a plurality of inelastic positioning straps adjustably connecting said lumbar belt to said front and back tension control means, said positioning straps maintaining said front and

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back tension control means in a relatively fixed position; and

5 (e) a plurality of elastic straps adjustably connecting said lumbar belt to said front and back tension control means.

9. The apparatus of claim 1 or 5 which further comprises a pair of straps adapted to hold the breast plate and back
10 plate in position on the person's body, wherein a first strap is connected at one end to the upper left portion of the breast plate, extends over the person's left shoulder and is connected at the opposite end to the upper left portion of the back plate, and a second strap is connected
15 at one end to the upper right portion of the breast plate, extends over the person's right shoulder, and is connected at the opposite end to the upper right portion of the back plate.

20 10. An apparatus for exercising the muscles surrounding the cervical spine of a person, comprising:

a head band adapted to fit around the person's head and including frontal and posterior portions;

25 a breast plate having an upper and lower portion;

a back plate having an upper and lower portion;

30 at least one strap adapted to hold the breast plate and back plate in position on the person's body;

a belt adapted to fit around the person's lower torso and lower back, said belt is connected to the breast plate or back plate;

35

a lumbar belt adapted to fit around a person's waist or lower torso, said lumbar belt is releasably coupled to the breast plate or back plate;

5 at least one elastic strap adapted to apply tensile loads between the head band and the upper portion of the breast plate; and

10 at least one elastic strap adapted to provide a tensile load between the upper portion of the back plate and the lumbar belt.

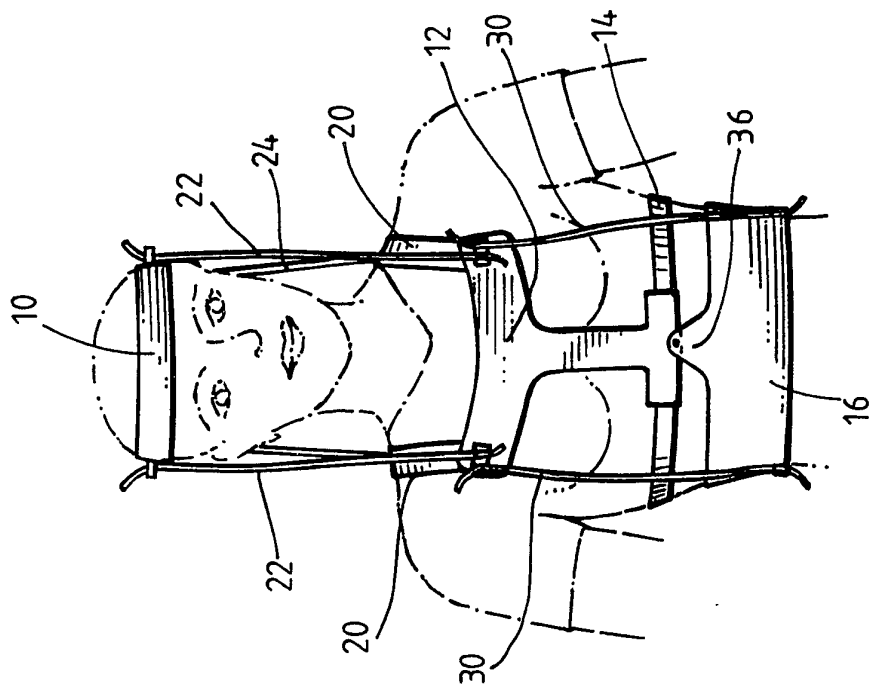


Fig. 1

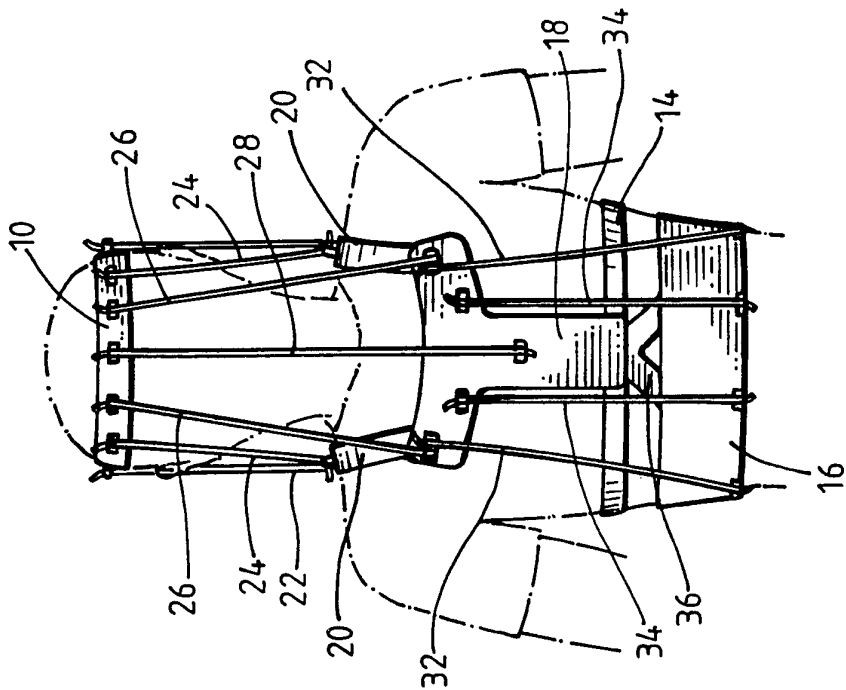


Fig. 2

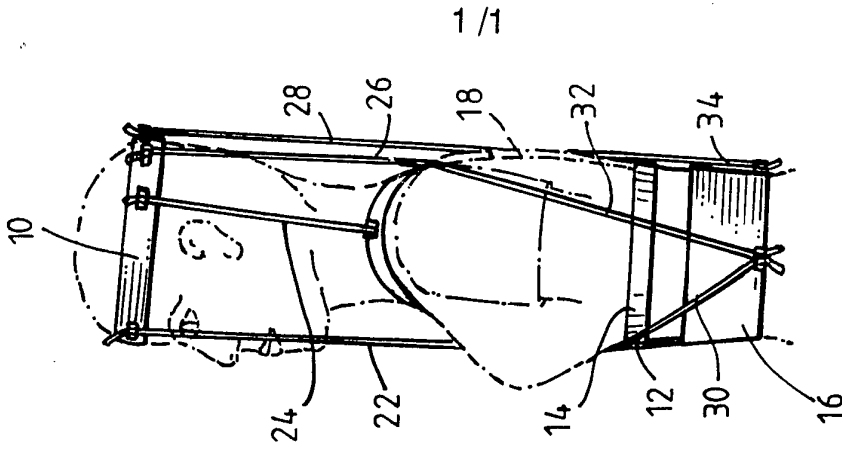


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 94/02636

A. CLASSIFICATION OF SUBJECT MATTER IPC 5 A63B23/025 A63B21/055				
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) IPC 5 A63B				
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 practical, search terms used)				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X Y	US,A,1 618 273 (DAVIDSON) 22 February 1927 see page 1, line 51 - line 94; figures ---	1,2 3,4,7-10		
Y	US,A,2 613 932 (MANNERS) 14 October 1952 see column 3, line 3 - line 37; figures ---	3,4,8-10		
Y	US,A,3 421 500 (JACOBSON) 14 January 1969 see column 5, line 69 - column 6, line 5; figures 9,10 ---	7,8		
A	US,A,3 497 217 (FEATHER) 24 February 1970 see abstract; figures ---	5		
A	FR,A,1 081 419 (VIGOR (S.A.R.L.)) 20 December 1954 see page 1, left column, last paragraph - right column, paragraph 3; figures 1,2 --- -/--	1,8,10		
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Date of the actual completion of the international search <div style="text-align: center; font-size: 1.2em;">11 July 1994</div>	Date of mailing of the international search report <div style="text-align: center; font-size: 1.2em;">10. 08. 94</div>			
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+ 31-70) 340-3016	Authorized officer <div style="text-align: center; font-size: 1.2em;">Jones, T</div>			

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 94/02636

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR,A,361 872 (SOCIÉTÉ BARDOU, CLERC ET CIE.) 10 December 1906 see page 2, line 33 - line 40; figures 2,4 ---	1,8,10
A	US,A,4 645 198 (LEVENSTON) 24 February 1987 see abstract; figures 1,8,9 ---	1,8,10
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INTERNATIONAL SEARCH REPORT

information on patent family members

International application No.

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US-A-3421500	14-01-69	NONE	
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