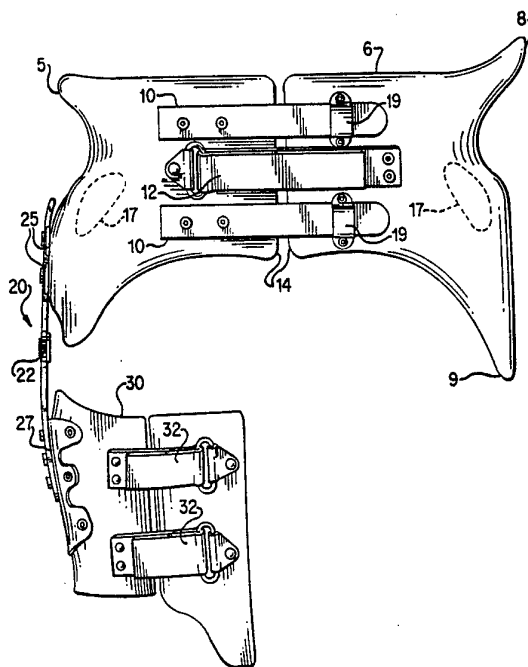




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(21) International Application Number: PCT/US93/06502 (22) International Filing Date: 9 July 1993 (09.07.93) (30) Priority data: 07/911,477 10 July 1992 (10.07.92) US (71) Applicant: NATIONAL ORTHOTIC LABORATORIES [US/US]; 101 Orange Co. Circle, N.E., Winter Haven, FL 33881-9430 (US). (72) Inventor: MODGLIN, Michael, D. ; 3229 Timberlin Road, Winter Haven, FL 33881 (US). (74) Agents: FIGG, E., Anthony et al.; Rothwell, Figg, Ernst & Kurz, 555 Thirteenth Street, N.W., Suite 701 East, Washington, DC 20004 (US).		(81) Designated States: AT, AU, BB, BG, BR, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, 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). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: HIP ABDUCTION SYSTEM**(57) Abstract**

A substantially rigid hip abduction system is disclosed which provides support for the hip joint of a human patient while being comfortably worn, even during ambulation. The hip abduction system is a bi-valve structure comprising a pelvic girdle having a first (5) and second (6) hip engaging means and a front and rear slidable guide means (10, 19) which facilitates precise positioning of the pelvic girdle and prevents vertical movement of the system. The hip abduction system of the present invention also includes elongated flanges (8, 9) on pelvic girdle which substantially eliminates migration thereof on the patient.

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HIP ABDUCTION SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention

5 This invention relates generally to orthopedic supports and braces and, more particularly, to a hip abduction system for stabilizing the a hip joint.

Background Art

10 Hip stabilizers or supports of various types have been employed for many years as devices for stabilizing a patient's hip joint who has suffered injury to the hip region or who has undergone a surgical procedure, such as hip replacement. Prior to the advent of hip stabilizers, a patient suffering from a hip injury was placed into a cast which stabilized the hip joint but
15 virtually immobilized the patient. The casts were often bulky, heavy and cumbersome which made handling and transporting the patient very difficult. Additionally, completely immobilizing a patient during healing period often resulted in muscle atrophy and
20 joint deterioration. To substantially eliminate these shortcomings, hip stabilization devices were created which both stabilized the hip joint while allowing limited movement to the thigh of the patient.

25 Hip stabilizers for many years have generally assumed the configuration of a corset or belt which were adapted to encircle a person's body in the waist area. These devices also comprised metal biasing

structures for supporting the hip joint which were attached to a thigh support structure. For example, a hip stabilizer of this general type is described in U.S. Patent No. 4,905,678 which shows an adjustable
5 belt made of leather or mildly flexible plastic extending circumferentially around the patient. A metallic biasing structure is provided for biasing the thigh of a patient at a desired angle and for supporting the hip joint. The biasing structure is
10 attached to a thigh engaging means which is an accurate shaped plastic support shaped to conform to the curvature of a patient's thigh.

Another known hip stabilizer is disclosed in U.S. Patent No. 4,957,103 which utilizes an orthopedic body
15 jacket including a semi-rigid thermoplastic shell adapted to be fitted around the abdomen of a patient. The body jacket has an opening along its ventral mid-line which enables the device to be placed around the patient which is fastened by an adjustable strap. The
20 body jacket also includes an integrally molded matrix plate for adjustably securing an orthotic component such as a caliper.

Although providing greater mobility than casts, many deficiencies have been recognized with the above-
25 described hip stabilizing devices. For example, the leather or semi-rigid belt structure has a serious shortcoming in that it often times permits slippage resulting in vertical and lateral movement of the brace. The orthopaedic body jackets provide better
30 support for the patient but are also subject to both slippage and improper positioning of the brace. These disadvantages deleteriously affect the proper functioning of the brace. Additionally, discomfort and pain have also been associated with the belts caused by

pinching or excessive pressure on the skin or over bony protuberances causing skin breakdown.

Thus, there is a great need for improvements in hip abduction systems.

5

SUMMARY OF THE INVENTION

Accordingly, the present invention provides a hip abduction system for supporting a patient's hip joint comprising a substantially rigid pelvic girdle means positioned about a patient, a hip abduction means
10 adjustably mounted to the pelvic girdle means for supporting a hip joint of a patient and a thigh engaging means connected to the hip abduction means for engaging a patient's thigh. The pelvic girdle means of the present invention comprises a first hip engaging
15 means for engaging a first hip on one side of a patient's body and a second hip engaging means for engaging a second hip on the opposite side of the patient's body. The first and second hip engaging means have upper and lower flanges which are
20 substantially contoured to the shape of a patient's body. The pelvic girdle also comprises front and back adjustment means which provide for precise positioning of the abduction system about a patient and over any bony protuberances. This feature will also prevent
25 pain and skin breakdown. The pelvic girdle means also comprises a sliding guide means which provides vertical stability and integrity to the pelvic girdle means. This and other features substantially reduce both vertical and horizontal movement of the system about
30 the patient which permits greater comfort and proper functioning.

According to another aspect of the present invention, the upper and lower flanges on the hip

engaging means opposite the hip abduction means are longer than the other flanges, gaining purchase across the rib cage and the superior lateral edge and the thigh on the inferior lateral edge. This feature substantially eliminates migration of the abduction system about the patient and prevents the loss of abduction caused by the support displacing the soft tissue of the abdominal region. This feature also permits the overall size of the hip abduction system to be reduced.

The hip abduction system according to the present invention is constructed to prevent both lateral and vertical movement of the brace on the patient and which optimally supports the hip joint of a patient. Also, the brace is light weight and can be worn comfortably by the user both under normal conditions and while exercising or engaging in physical therapy, while still providing optimum support to the hip joint area.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a front view illustrating the hip abduction system according to the present invention;
Figure 2 is a rear view of the hip abduction system according to the present invention;

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A hip abduction system, in accordance with one embodiment of the invention, for supporting the hip joint of a human patient will be discussed in detail with reference to Figure 1 which shows a substantially rigid pelvic girdle means 1 for adjustably supporting the hip region of the patient. Pelvic girdle means 1 comprises a first hip engaging means 5 for engaging a first hip on one side of a patient's body and a second

hip engaging means 6 for engaging a second hip on an opposite of a patient's body. The first and second hip engaging means are adapted to fit about the patient's hip region. First and second hip engaging means are also each constructed to fit about the patient's hip region and are fastened together by fastening means 12 near the center region of a patient's body. See Figures 1 and 2. In a preferred embodiment, fastening means 12 is a hook and pile strap. Figure 1 also illustrates that the first and second hip engaging means are substantially contoured to the shape of a patient's hip or waist region. Providing the contoured first and second hip engaging means enables precise positioning of the brace on the front bony protuberances of a patient's hips. These features substantially eliminate both vertical and horizontal slippage of the brace about the patient.

The pelvic girdle of the present invention is a "bi-valve" structure wherein the first hip engaging means 5 is a first valve of the bi-valve structure and the second hip engaging means 6 is a corresponding second valve of the bi-valve structure. As illustrated in Figures 1 and 2, the first and second valves extend about the opposite sides of the patient's body. Each valve has front end portion 14 and a back end portion 15 wherein the front end portion of the first valve is positioned adjacent the front end portion of the second valve at a front portion of a patient's body. The back end portion of the first valve is positioned adjacent the back end portion of the second valve near the back portion of the patient's body.

Pelvic girdle means 1 further comprises a slidable guide means 10 for facilitating the proper positioning of the hip engaging means 5 and 6 about a patient. In

a preferred embodiment of the present invention, the slidable guide means is a substantially rigid sliding guide member which are slidable through channels 19 , as shown in Figures 1 and 2. The substantially rigid
5 slidable guide means 10 permits the hip support means to be precisely secured to the patient in any desired position. The slidable guide means 10 enables the pelvic girdle to be adjusted about the patient without vertical migration. This affords both vertical
10 stability and integrity to the pelvic girdle means. This feature of the invention is particularly advantageous since patients often experience weight fluctuations while recovering from injuries which involve immobilization. The pelvic girdle can
15 accommodate patients having Scoliosis by mounting the slidable guide means to accommodate a position over the anterior superior iliac spine (A.S.I.S.) or other bony protuberances to prevent pain and skin breakdown while insuring or maintaining the vertical stability and
20 integrity of the pelvic girdle.

The slidable guide means 10 can be any suitable substantially rigid structure, such as a rigid plastic material or the like, which is slidable into and out of an open channel, such as channel 19.

25 In a preferred embodiment of the present invention, the pelvic girdle means comprises a slidable guide means on the rear portion thereof which secures the rear side of the first and second hip engaging means about the patient, as illustrated in Figure 2.
30 The slidable guide means illustrated in Figure 2 can be the same slidable guide means described above in connection with Figure 1. Providing front and rear slidable guide means enables a secure fit and substantially prevents any vertical movement of the

pelvic girdle means on the patient. The slidable guide means on the posterior region of the pelvic girdle means enables the hip abduction system to be adjusted without vertical movement of the pelvic girdle on the patient.

The hip abduction system according to the present invention also comprises a waist support means positioned on the internal portion of the first and second hip engaging means 5 and 6. In a preferred embodiment, the waist support means comprises recesses 17, illustrated in phantom in Figure 1, formed on an internal portion of the first and second hip engaging means for engaging the front bony protuberances of a patient's hips and facilitate proper positioning of the brace. In a most preferred embodiment, the internal recess 17 is formed integrally with the first and second hip engaging means.

The pelvic girdle means 1 is constructed with any suitable substantially rigid material which will provide proper patient support but which will also allow flexation. In a preferred embodiment, the pelvic girdle means is constructed with a low density polyethylene material. To provide the desired support and comfort, the polyethylene material as used in a preferred embodiment is approximately 1/16" to 5/16" thick and, preferably, 3/16" thick. Also in a preferred embodiment, the pelvic girdle comprises an aliplast (foam liner) of approximately 1/16" to 1/4" and, preferably, approximately 1/8".

The hip abduction system of the present invention further comprises a hip abduction means 20 for supporting the hip joint of a patient, schematically illustrated in Figure 1. The hip abduction means 20 comprises a metal caliper 22 which can be locked at a

desired angle for a particular patient, and which supports the patient's weight when used and restricts the patient's range of motion. Hip abduction means 20 can be any suitable mechanism for supporting the patient's weight and locking the brace at a desired angle which are used in abduction systems of this type.

5 Metal caliper 22 is mounted at an upper region to either the first or second hip engaging means by any suitable means, such as appropriate screws. In a preferred embodiment, the upper portion of metal
10 caliper 22 comprises channels 25 which enable the caliper to be adjustably mounted to the hip engaging means, as schematically illustrated in Figure 1.

The hip abduction system according to the present invention further comprises a thigh engaging means 30
15 for engaging the patient's thigh and enabling proper support of the hip joint. Thigh engaging means 30 is contoured to the shape of a patient's thigh and is secured thereto by any suitable fastening means, such as by hook and pile straps 32 illustrated in Figure 1.
20 The thigh engaging means 30 is mounted to a lower end of metal caliper 22 by any suitable means, such as appropriate screws. In a preferred embodiment, the lower portion of metal caliper 22 has channels 27 which
25 enable the caliper to be adjustably mounted to the thigh engaging means, as schematically illustrated in Figure 1.

In accordance with a preferred embodiment of the present invention, the pelvic girdle comprises upper
30 and lower flanges which substantially contour the shape of the patient's body. In a most preferred embodiment, the flanges on the hip engaging means opposite the abduction means, illustrated at 8 and 9 in Figure 1, are longer than the other flanges of the other hip

engaging means. Providing longer flanges on the hip engaging means opposite the abduction means substantially eliminates brace migration into the soft tissue of the abdominal region which enables the
5 abduction system to function more properly by controlling the long level arm of the leg through the purchase of the rib cage and thigh instead of the soft tissue of the abdominal region. It also permits the system to be worn more comfortably by the patient.

10 In another preferred embodiment of the present invention, the flanges on both sides of the hip engaging means are initially of equal length and the flanges on the same side as the abduction means, which ever side is selected, are then shortened, as
15 illustrated by the hip abduction system of Figure 1. This construction permits uniform construction of the pelvic girdle which can be adapted to support either hip joint of a patient.

The hip abduction system according to the present
20 invention substantially supports the patient's weight thereby stabilizing and eliminating pressure from the patient's hip joint. The pelvic girdle of the present invention provides a bi-valve structure with front and rear slidable guide means which substantially
25 eliminates vertical movement of the brace on the patient. Additionally, the longer upper and lower flanges on the hip engaging means opposite the abduction means substantially prevents the brace from migrating over the patient's body. By eliminating
30 unwanted brace movement, the abduction system according to the present invention provides better support for a patient's hip joint and can be worn easily and comfortably.

Although the invention has been described in connection with ceratin embodiments, it is not limited to them. Modifications within the scope of the following claims will be apparent to those skilled in the art without derogating the scope of the applicants' novel contribution to the art.

What is claimed is:

1. A hip abduction system for stabilizing a hip joint, comprising:

5 a) a substantially rigid pelvic girdle means for adjustably supporting a patient's hips, said pelvic girdle means comprising at least a first substantially rigid hip engaging means for engaging a first hip on one side of a patient's body, and a second substantially rigid hip engaging means for engaging a second hip on the opposite side of the patient's body,
10 said pelvic girdle means further comprising an adjustable fastening means for adjustably fastening said first hip engaging means and said second hip engaging means around a patient;

b) a hip abduction means for supporting a
15 hip joint of a patient, said hip abduction means being connected to at least one of said first or said second hip engaging means; and

c) a thigh engaging means for engaging a patient's thigh, said thigh engaging means being
20 connected to said hip abduction means.

2. The hip abduction system according to claim 1, wherein said pelvic girdle means further comprises a slidable guide means for securing said pelvic girdle means about a patient and for eliminating vertical
5 movement of said system.

3. The hip abduction system according to claim 2, wherein said slidable guide means comprises a slidable guide member which slides through a channel means.

4. The hip abduction system according to claim 3, wherein said pelvic girdle is a bi-valve structure wherein said first engaging means is a first valve of the bivalve structure and said second engaging means is

5 a corresponding second valve of the bivalve structure,
said first and second valves extending about opposite
sides of said patient's body, each said valve having a
front and back end portion, said front end portion of
the first valve being positioned adjacent the front end
10 portion of the second valve at a front portion of the
patient's body and the back end portion of the first
valve being positioned adjacent the back end portion of
the second valve at a back portion of the patient's
body, wherein said locking means comprises a front and
15 a back slidable guide means positioned adjacent
respective front and back portions of the patient.

5. The hip abduction system according to claim
1, wherein said first and second hip engaging means
have upper and lower flange portions.

6. The hip abduction system according to claim
5, wherein said hip abduction means is mounted to said
first hip engaging means.

7. The hip abduction system according to claim
6, wherein said upper and lower flanges of said second
hip engaging means are longer than the upper and lower
flanges of said first hip engaging means.

8. The hip abduction system according to claim
6, wherein said first and second hip engaging means
comprise a waist support means for positioning said
pelvic girdle means on said patient.

9. The hip abduction system according to claim
8, wherein said waist support means comprises recesses
formed on an internal portion of said first and said
second hip engaging means for engaging front bony
5 protuberances of a patient's hips.

10. A hip abduction system for stabilizing a hip
joint, comprising:

a) a substantially rigid pelvic girdle means for adjustably supporting a patient's hips, said pelvic
5 girdle means comprising:

i. at least a first substantially rigid hip engaging means and a second substantially rigid hip engaging means, said first and second hip engaging means comprising upper
10 and lower flanges;

ii. an adjustable fastening means for adjustably fastening said first hip engaging means and said second hip engaging means about a patient;

15 iii. a slidable guide means for supporting said first and second hip engaging means about a patient and for eliminating vertical movement of the system;

b) a hip abduction means for supporting a hip
20 joint of a patient, said hip abduction means being connected to at least one of said first or said second hip engaging means;

c) a thigh engaging means for engaging a patient's thigh, said thigh engaging means being
25 connected to said hip abduction means; and

wherein said upper and lower flanges on a hip engaging means opposite the hip engaging means having the abduction means mounted thereto are longer than the upper and lower flanges on the other hip engaging means
30 thereby substantially reducing migration of the system about a patient.

11. A hip abduction apparatus for stabilizing a patient's hip joint against undesired movement, the apparatus comprising:

5 pelvic girdle means for adjustably supporting a person's hip including first and second hip engaging

means for respectively engaging a first hip on one side of the patient's body and a second hip on an opposite side of the patient's body;

adjustable fastening means for adjustably
10 fastening said first and second hip engaging means around the patient;

hip abduction means for directly contacting and supporting a hip joint of the patient, said hip
abduction means being spaced from and connected to one
15 of said first and second hip engaging means; and

thigh engaging means separate and spaced from said pelvic girdle means for surrounding the patient's thigh at an area below the hip joint, said thigh engaging means being connected to said hip abduction means to
20 limit the movement of the patient's thigh.

12. A hip abduction apparatus as in claim 11, wherein said first and second hip engaging means each include upper and lower flanges, and the upper and lower flanges of the hip engaging means disposed on the
25 side of the patient's body opposite said hip abduction means are longer than the upper and lower flanges of the hip engaging means disposed on the same side of the patient's body as said hip abduction means.

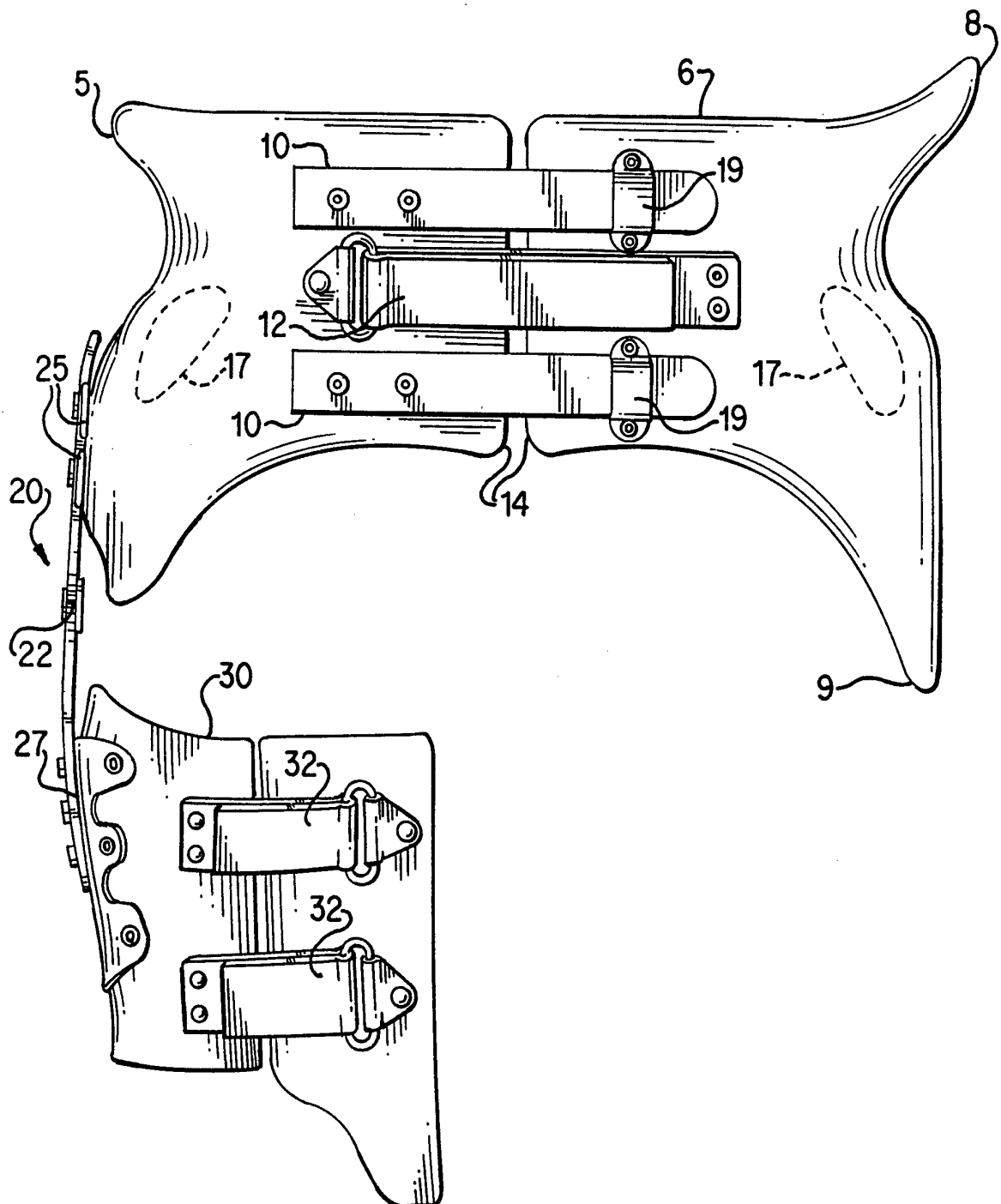


FIG. 1

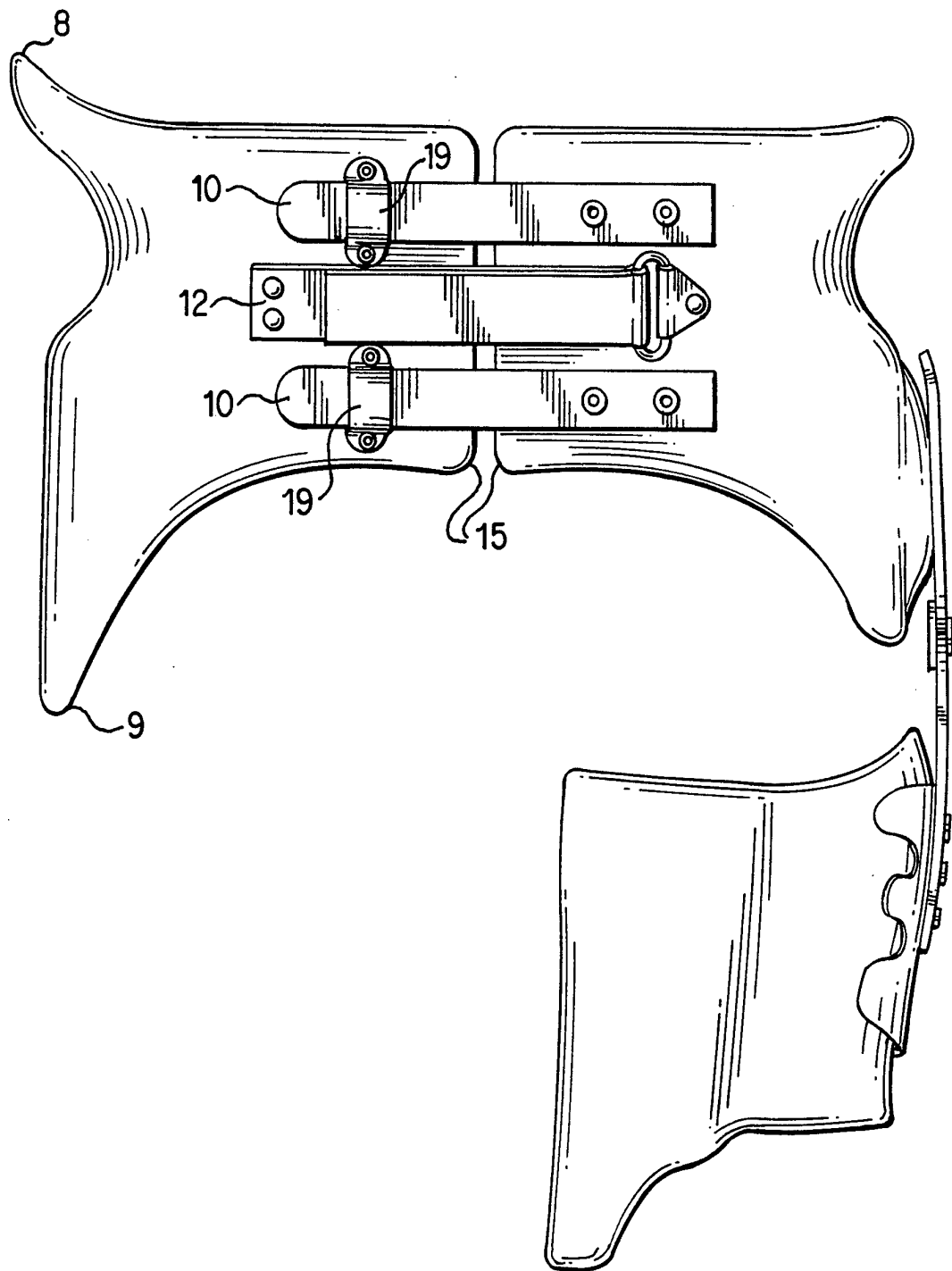


FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US93/06502

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :A61F 5/00

US CL :602/19

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)

U.S. : 602/19, 5, 6, 16, 23-25

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4,202,327 (GLANCY) 13 May 1980, see reference numerals 12, 14, 60, & 64.	1-6, 8-9
X	US, A, 4,901,710 (MEYER) see reference numerals 11, 14, & 16. 20 February 1990.	1-3, 11
A	US, A, 4,574,790 (WELLERSHAUS), see reference numerals 2, 3, 5, & 6. 11 March 1986.	1-12
A	US, A, 4,497,315 (FETTWEIS ET AL) see reference numerals 2, 4, & 6. 05 February 1985	1-12

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search

05 October 1993

Date of mailing of the international search report

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Authorized officer

Richard J. Apley

Telephone No. (703) 308-0858