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(54) Title: BACKPACK SUSPENSION SYSTEM

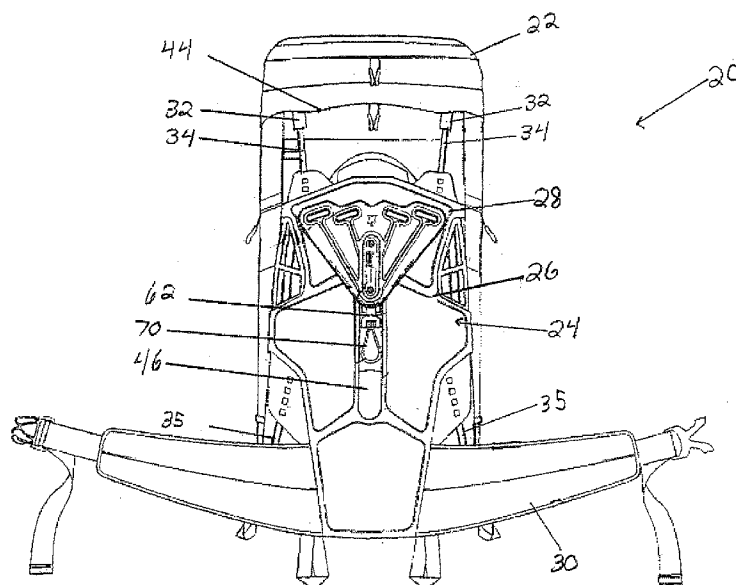


FIG. 1

(57) Abstract: A suspension system for a backpack. The suspension system includes a hub that is attached to the sack for the backpack, and a yoke that is attached to the hub and is movable up and down with respect to the hub. The yoke is attached to shoulder straps for the backpack. Moving the yoke allows the backpack, and specifically the distance from the waist belt to the shoulder straps, to be adjusted to a particular user.

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## BACKPACK SUSPENSION SYSTEM

### REFERENCE TO RELATED APPLICATIONS

5       The present application claims priority to U.S. Provisional patent application serial Number 60/974,692, filed September 24, 2007 and U.S. Provisional patent application serial Number 60/985,896, filed November 6, 2007, and incorporated herein by reference.

### FIELD OF THE INVENTION

10       The present disclosure relates to backpacks, and more particularly to a system and method for adjusting the fit of a backpack on a user.

### BACKGROUND OF THE INVENTION

15       Backpacks are used by hikers, mountain climbers, campers, etc. for carrying camping gear, clothing, food, and the like. Backpacks fall into two broad categories external frame backpacks and internal frame backpacks. An external frame backpack includes a frame and a separate bag or sack which is removably mounted on the frame. An internal frame backpack includes a sack with frame structure which is integrated into the inside of the sack.

20       Weight and strength are important characteristics of a backpack frame. The frame should be light yet strong. The frame should also be shaped to fit the anatomy of the backpacker. Some frames are constructed so rigidly that the frames have little or no torsional flexibility, which permits the frame to flex with movements of the body.

The suspension system of a backpack commonly includes a pair of shoulder straps, a waist belt, and a back pad. The suspension system should be adjustable to accommodate various torso lengths and should comfortably support the load on the backpacker. An example of an exemplary backpack frame is shown in U.S. patent number 5,762,243, entitled Backpack Assembly, the contents of which are incorporated by reference in its entirety.

#### SUMMARY OF THE INVENTION

The following presents a simplified summary of some embodiments of the invention in order to provide a basic understanding of the invention. This summary is not an extensive overview of the invention. It is not intended to identify key/critical elements of the invention or to delineate the scope of the invention. Its sole purpose is to present some embodiments of the invention in a simplified form as a prelude to the more detailed description of some embodiments that are presented later.

In accordance with an embodiment, a suspension system for adjusting the position of shoulder straps on a backpack is provided. The suspension system (shoulder strap adjustment mechanism) includes a hub that is attached to the sack for the backpack, and a yoke that is attached to the hub and is movable up and down with respect to the hub. The yoke is attached to shoulder straps for the backpack. Moving the yoke allows the backpack, and specifically the distance from the waist belt to the shoulder straps, to be adjusted to a particular user.

In an embodiment, the hub includes a back panel that is inserted in a back pocket of a sack for the backpack. The back panel may alternatively be encased within the backpack sack, or partially encased within the backpack sack. The panel may also be sewn to the backpack sack. The yoke may be partially or fully included within the sack, wherein the shoulder straps extend from the yoke out of the sack.

The hub may include removable and/or interchangeable stays that attach the hub to the backpack sack and/or a waist belt for the backpack. A central stay may be provided that extends from a bottom of the hub to a location on the belt, thereby providing a central point of stability for the backpack.

In an embodiment, the yoke is attached to a slider that moves along a structure, such as a center channel, in the backpack. The slider is releasably lockable in multiple different locations. In an embodiment, the slider includes a rocker latch that locks to teeth in the center channel. A user may simply release the rocker latch, for example against the bias of a spring, to allow movement of the slider along the center channel. The slider may then be locked back in place by allowing the rocker latch to engage a different set of teeth along the center channel.

The releasable lock for maintaining the slider in position may include a strap or other structure that allows access to and release of the releasable lock, especially where the releasable lock may be hard to reach. For example, if the slider and the releasable lock are mounted inside a sack for backpack, then the strap may permit release of the releasable lock without having to access the inside of the backpack sack. In addition, a strap may be of sufficient length so

that a user may adjust the releasable lock while the backpack is on the user's back.

Other features of the invention will become apparent from the following detailed description when taken in conjunction with the drawings, in  
5 which:

#### BRIEF DESCRIPTION OF THE DRAWINGS

A more complete understanding of the present invention, and the attendant advantages and features thereof, will be more readily understood by  
10 reference to the following detailed description when considered in conjunction with the accompanying drawings wherein:

FIG. 1 depicts a back view of a backpack incorporating a shoulder strap adjustment system of the present disclosure;

FIG. 2 depicts a back view of the backpack of FIG. 1, with a yoke for  
15 the shoulder strap adjustment system removed;

FIG. 3 depicts a side perspective view of the shoulder strap adjustment system for the backpack of FIG. 1;

FIG. 4 depicts a side perspective view of the shoulder strap adjustment system for the backpack of FIG. 1, with the yoke, struts, and stays removed;

20 FIG. 5 depicts a side perspective view of a slider and center channel for the shoulder strap adjustment system shown in FIG. 4;

FIG. 6 depicts a side perspective view of the center channel of FIG. 5;

FIG. 7 depicts a side perspective view of the slider of FIG. 5;

FIGS. 8 depicts a front isometric view of a back panel for a backpack including a shoulder strap adjustment mechanism;

FIG. 9 depicts a back isometric view of the back panel of FIG. 8;

FIG. 10 depicts a front isometric view of a another back panel for a backpack including a shoulder strap adjustment mechanism;

FIG. 11 depicts a back isometric view of the back panel of FIG. 10;

FIG. 12 depicts a front isometric view of a another back panel for a backpack including a shoulder strap adjustment mechanism;

FIG. 13 depicts a back isometric view of the back panel of FIG. 12;  
and

FIG. 14 depicts a front isometric view of a back panel for a backpack including a shoulder strap adjustment mechanism.

#### DETAILED DESCRIPTION OF THE INVENTION

The present disclosure provides an apparatus for adjusting the position of the shoulder straps on a backpack. The adjustment system includes a guide channel centrally located within/on a back panel of a backpack. An adjustable slider is slidably positioned within the guide channel, where a locking mechanism locks the position of the slider within the guide channel. The shoulder straps are operably connected to the slider. A movement of the slide within the guide channel adjusts the position of the shoulder straps.

Referring now to the drawing figures in which like reference designators refer to like elements, there is shown in FIGS. 1 and 3 a backpack

20 in accordance with the present disclosure. Backpack 20 is an internal frame backpack, but features herein may be utilized in backpacks having other frames. Backpack 20 includes a sack 22 into which gear or other supplies are placed. A suspension system 24 is connected to the sack 22. The suspension  
5 system 24 includes a hub, in the shown embodiment, a back panel 26.

The backpack 20 includes a waist belt 30 and two strut pockets 32, at upper corners of the back of the sack 22. Typically, load control webbing straps (also called load adjusters) are attached to these pockets 32. Upper struts 34 extend from the top of the back panel 26 into the strut pockets 32 on  
10 the sack 22. Additional lower struts 35 extend from the bottom of the back panel 26 to lower pockets (not shown) which may be included on either or both of the sack 22 and the waist belt 30. An additional central stay 36 extends down from the back panel 26 into a back pocket (not shown) of the waist belt 30. The center stay 36 provides a center point of stability for the  
15 suspension system 24.

The struts 34, 35, and stay 36 may be hollow fiberglass or tensile aluminum (or other materials), and may be interchangeable. The bottom struts 35 may be tied to the belt 30 so as to integrate the bottom of the backpack 20 with a backpacker's movement. The back panel 26 includes strut channels 38, 40, and stay channel 41 for receiving the struts 34, 35 and stays 36. These  
20 stays may be removable, and may be interchangeable with stays having different flexibilities, so as to provide a different feel for a backpacker. As an example, stiffer stays may be used so as to limit the torsional flexibility of the backpack, whereas more flexible stays may be used to provide a backpack  
25 having greater torsional flexibility.

To provide for adjustment of the shoulder straps, a yoke 28 is slidably attached to back panel 26, where the shoulder straps (not shown, but known) are connected to the yoke 28. Briefly described, the slidable attachment of the yoke 28 to the back panel 26 permits the attachment of the shoulder straps to the backpack 20 to be easily and quickly adjusted along the vertical, longitudinal, length of the back panel 26.

Referring to FIGS. 2 and 4, a center guide channel 46 is provided partially along the longitudinal length of the back panel 26. A slider 48 is mounted within the center channel 48, where the slider 48 can be sliding moved along the length of the center channel 46 for sliding movement along the center channel 46.

Referring also to FIG. 5, the center channel 46 includes a back 50 which is adjacent to, or is formed as part of, a portion of the back panel 26. An annular rim 52 is positioned around a top edge of the center channel 46. Angled teeth 54 are located at a bottom portion of the center channel 46( see also FIG. 6).

As shown in FIG. 7, the slider 48 includes a lower plate 58 sized to fit between the annular rim 52 and the back 50. In this manner, when the slider 48 moves along the center channel 46, the lower plate 58 slides between the annular rim 52 and the back 50. The slider 48 includes a post 60 extending upwardly there from.

The longitudinal position of the slider 48 within the center channel 46 can be locked with a locking mechanism. Referring again to FIG. 5, a locking mechanism can include a rocker latch 62. An upper portion of the rocker latch

62 is pivotally mounted to the slider 48 with a rocker axle 66, where the rocker latch 62 is pivotable about the rocker axle 66. An opposite end of the rocker latch 62 can include a pair of oppositely extending protrusions 64 extending outwardly from opposite sides of the rocker latch 62.

5           Each of the protrusions 64 on the rocker latch 62 is configured to fit within slots 55 formed between adjacent pairs (on the same side of the center channel 46) of angled teeth 54. In this manner, the protrusion 64 fit within opposite slot pairs 55 located on opposite sides of the center channel 46 when the rocker latch 62 is in a down, locked, position. In the locked position, the  
10           protrusions 64 are position inside the slots 55, toward the inside of the center channel 46. The engagement of the protrusions 64 within slots 55, between adjacent angled teeth 54, secures the position of the slider 48 within the center channel 46.

          A bias member can be provided on the rocker latch 62, where the bias  
15           member biases the rocker latch 62 in a down, locked, position. A spring may be positioned, for example, about the rocker axle 66. The bias member biases the protrusions 64 into the slots 55 formed between adjacent pairs of angled teeth 54. The rocker latch 62 thus prevents movement of the slider 48 along the longitudinal length of the center channel 46.

20           A strap loop 68 can be positioned between the two protrusions 64. A strap 70 (FIG. 1) may be attached to the strap loop 68. The strap 70 provides a handle for movement of the rocker latch 62. For example, a user may pull outward on the strap 70 to move the rocker latch 62 between and open and locked position.

In use, the protrusions 64 on the rocker latch 62 fit behind in the slots 55 between pair of adjacent angled teeth 54. The spring biases the protrusions 64 into the slot 55. The rocker latch 62 thus prevents movement of the slider 48 along the center channel 46.

5 To release the lock provided by the rocker latch 62, a user may pull on the strap 70, releasing the protrusions 64 from slot 55, permitting the slider 48 to move freely along the center channel 46. During this movement, the lower plate 58 of the slider 48 moves along the groove formed between the annular rim 52 and the back 50 of the center channel 46. Then the slider 48 has been  
10 moved to a desired position, the user may release the strap 70, causing the protrusions 64 to lock into and the slots 55 at that location.

Referring to FIGS. 1-3, the yoke 28 is attached to the post 60 of the slider 48. As such, when a user adjusts the position of the slider 48 within the center channel 46, the yoke 28 is simultaneously moved. The yoke 28 can be  
15 triangular in shaped and have slots 72, 74, 76, 78 positioned at a top edge of the yoke 28. The two outer slots 72, 78 provide a first pair of slots for attachment of shoulder straps, and the two inner slots 74, 76 provide a second set of attachments for a set of shoulder straps. The outer slots 72, 78 may be utilized for a person having broader shoulders, and the inner slots 74, 76 may  
20 be utilized for a person having more narrow shoulders or desiring a different fit of shoulder straps.

To move the yoke 28, a user may pull outward on the strap 70 to move the rocker latch 62 between and open and locked position. The slider 48, and yoke 28, are moved along the center channel 46 to position the yoke 28 is a  
25 comfortable position for the user. Once the yoke 28 has been positioned, the

user may release the strap 70, causing the protrusions 64 to lock into the slots

55. The movement of the yoke 28 provides simple relocation of the slots 72, 74, 76, 78 for shoulder straps so that the backpack 20 may be quickly and easily arranged to fit a particular user.

5           In am method of use, after shoulder straps are attached to a desired set of slots 72, 78 or 74, 76, the backpack 20 may be placed on the back of a user. The strap 70 may be pulled to release the slider 48, and the yoke 28 may be moved until the shoulder straps and the waist belt 30 are arranged in a comfortable manner on the user. The strap 70 is released, locking the position  
10 of the shoulder straps on the user.

          In the embodiment shown in the drawings, the back panel 26 is bowed so as to contour to the back of multiple different users, and thus to move the yoke 28 along a contoured path so that the yoke 28 fits to a user's back despite its location along the center channel 46.

15           If desired, the strap 70 may be made longer so that it may extend to a location so that a user may easily grasp it and release the rocker latch 62 while the backpack 20 is on the user's back. In addition, in an embodiment, the rocker latch 62 may be encased inside the pocket 44 and/or the sack 22. In such an embodiment, the strap 70 may be of sufficient length to extend  
20 outward and be grasped by a user.

          In the embodiment shown in the drawings, the back panel 26 is positioned in a pocket 44 on the back of the sack 22. The yoke 28 is fully accessible outside of the pocket 44. Alternatively, the back panel 26 or another hub may be positioned fully inside or partially inside the sack 22. In

addition, the yoke 28 or a portion of the yoke 28 may be positioned in a pocket, such as the pocket 44, or a portion of the sack 22. In either event, shoulder straps that are attached to the yoke 28 extend outward from the sack 22 so that they may be placed on the shoulders of the backpacker, with the back of the backpacker against the back of the backpack 20.

The back panel 26 may be formed, for example, of plastic, a composite material, or another suitable material. In an embodiment, the back panel 26 includes a number of openings to lighten the overall weight of the back panel 26. These openings may be provided in positions so that they do not reduce the overall stiffness of the back panel 26. The yoke 28 may also be made of plastic, a composite, or another suitable material.

In another embodiment, the adjustment mechanism can be used on light weight backpacks. Referring to FIGS. 8 and 9, a back panel 80 for a light weight backpack is provided. The back panel 80 includes a longitudinal channel 81 into which a center channel 82 is positioned. The center channel 82 is affixed through the back surface 84 of the back panel 80 extending through the front surface 86 thereof. The center channel 82 is similar in structure to center channel 46.

The center channel 82 is mounted substantially flush with the front surface 86 of the back panel 80. The substantially flush mounted of the back panel 80 and center channel 82 provides a reduced profile on the front surface 86, reducing the thickness of foam required on the back panel 80.

A slider 88 is mounted within the center channel 82, where the slider 88 can be slidingly moved along the longitudinal length of the center channel 82. The slider 88 is similar in structure to slider 48.

Referring to FIGS. 10 and 11, a back panel 90 for a light weight backpack is provided. A center channel 92 is mounted to a front surface 94 of the back panel 90. The center channel 92 is similar in structure to center channel 46. As the center channel 92 does not extend through the back panel 90, the back surface 98 of the back panel is substantially smooth.

A slider 96 is mounted within the center channel 92, where the slider 96 can be slidingly moved along the longitudinal length of the center channel 92. The slider 96 is similar in structure to slider 48.

Referring to FIGS. 12 and 13, a back panel 100 for a light weight backpack is provided. The back panel 100 is formed by injection molding. The front surface 102 of the back panel 100 includes a longitudinal indented channel 104 into which a center channel 106 is mounted. The center channel 106 is similar in structure to center channel 46.

The longitudinal indented channel 104 is sized such that a top surface 108 of the center channel 106 is substantially flush with the front surface 102 of the back panel 100. The substantially flush mounting of the center channel 106 provides a reduced profile on the front surface 102, reducing the thickness of foam required on the front surface 106 of the back panel 100.

A slider 110 is mounted within the center channel 106, where the slider 110 can be slidingly moved along the longitudinal length of the center channel 106. The slider 110 is similar in structure to slider 48.

The back panels 80, 90, 100 may be formed, for example, of plastic, a composite material, or another suitable material. The back panels 80, 90, 100 can include a number of openings to lighten the overall weight of the back panel 80, 90, 100. These openings may be provided in positions so that they  
5 do not reduce the overall stiffness of the back panel 80, 90, 100.

In FIGS 8-13 a yoke 28 can be attach to the sliders, 88, 96, or 110, allowing for the adjustment of the shoulder belts and previously disclosed. Alternatively, as shown in FIG. 14, the shoulder belts 114, 116 can be connected directly to the slider 88, 96, or 106. The method of adjusting the  
10 position of the shoulder belts 114, 116 is the same as previously describe for the adjustment of the shoulder belts with the yoke 28.

It is also envisioned, that the yoke 28 can be eliminated for the embodiments of FIG. 1-7, where the shoulder belts would be directly connected to slider 48.

In the previous description, various embodiments of the present invention are  
15 described. For purposes of explanation, specific configurations and details are set forth in order to provide a thorough understanding of the embodiments. However, it will also be apparent to one skilled in the art that the present invention may be practiced without the specific details. Furthermore, well-known features may be omitted or simplified in order not to obscure the embodiment being described. In  
20 addition, to the extent that orientations of the embodiments are described, such as "top," "bottom," "front," "rear," "right," and the like, the orientations are to aid the reader in understanding the embodiment being described, and are not meant to be limiting.

All references cited herein are expressly incorporated by reference in their entirety.

It will be appreciated by persons skilled in the art that the present invention is not limited to what has been particularly shown and described herein above. In addition, unless mention was made above to the contrary, it should be noted that all of the accompanying drawings are not to scale. A variety of modifications and variations are possible in light of the above teachings without departing from the scope and spirit of the invention, which is limited only by the following claims.

What is claimed is:

1. A backpack, comprising:

a sack;

a back panel affixable to the sack;

5 a slider adjustably mounted on the back panel; and

shoulder straps operably connected to the slider, wherein a movement of the slider longitudinally along the back panel adjusts the position of the shoulder straps on the back panel.

10 2. A backpack as set forth the in claim 1, wherein a center channel is position on the back panel, the slider being adjustably, slidingly, positioned within the center channel.

3. A backpack as set forth in claim 2, wherein the slider includes a  
15 locking mechanism acuatable between a locked and an unlocked position, wherein the slider is free to move along the center channel when the locking mechanism is in the locked position and the position of the slider is fixed within the center channel when the locking mechanism is in the locked position.

20 4. A backpack as set forth in claim 3, further comprising a yoke attached to the slider, the yoke include shoulder strap attachment points, wherein the shoulder straps are connected to the shoulder strap attachment points.

25

5. A backpack as set forth in claim 2, wherein the shoulder straps are connected to the slider.

6. A backpack as set forth in claim 1, wherein the center channel extends along at least a portion of a longitudinal length of the back panel.

7. A backpack as set forth in claim 6, wherein the position of the slider on the back panel is adjustably along the longitudinal length of the center channel.

10

8. An apparatus for adjusting the position of shoulder straps on a backpack comprising:

a back panel having a longitudinal length;

a center channel affixed to the back panel, along the longitudinal length of the back panel;

a slider adjustably, slidingly, positioned within the center channel, wherein the shoulder straps are operably connected to the slider.

9. An apparatus for adjusting the position of shoulder straps on a backpack as set forth in claim 8, the slider comprising a locking mechanism acuatable between a locked and an unlocked position.

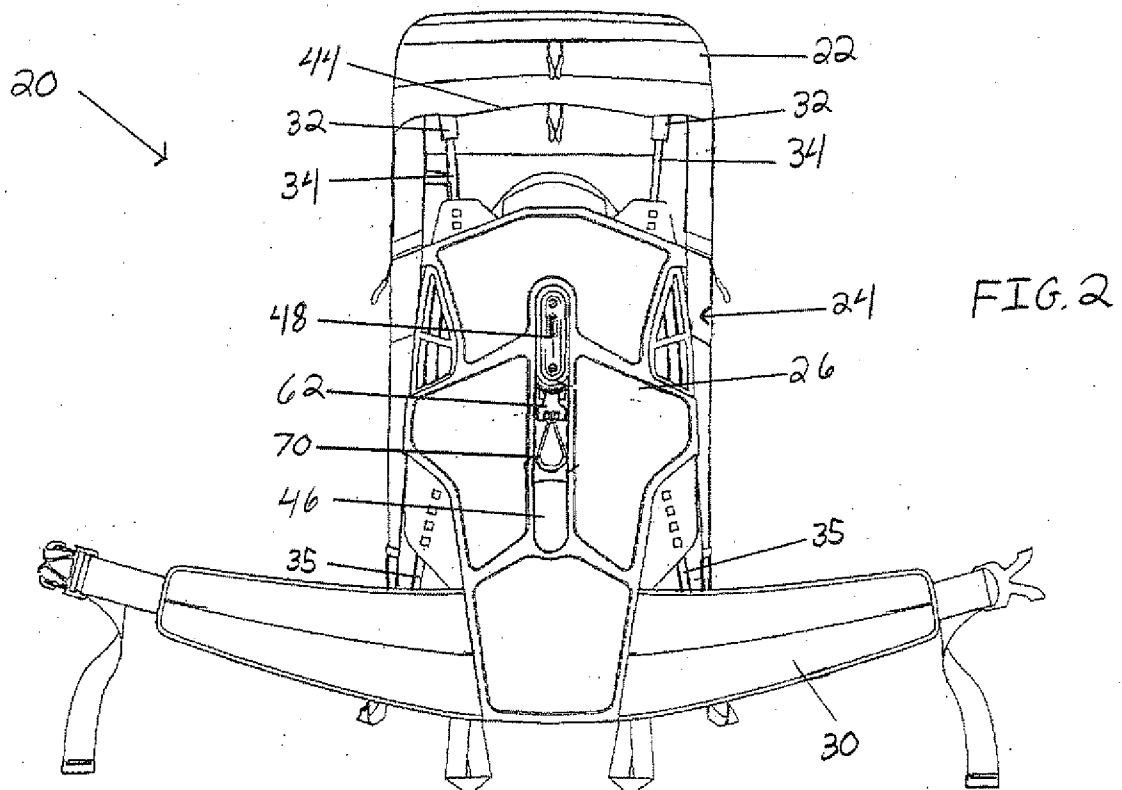
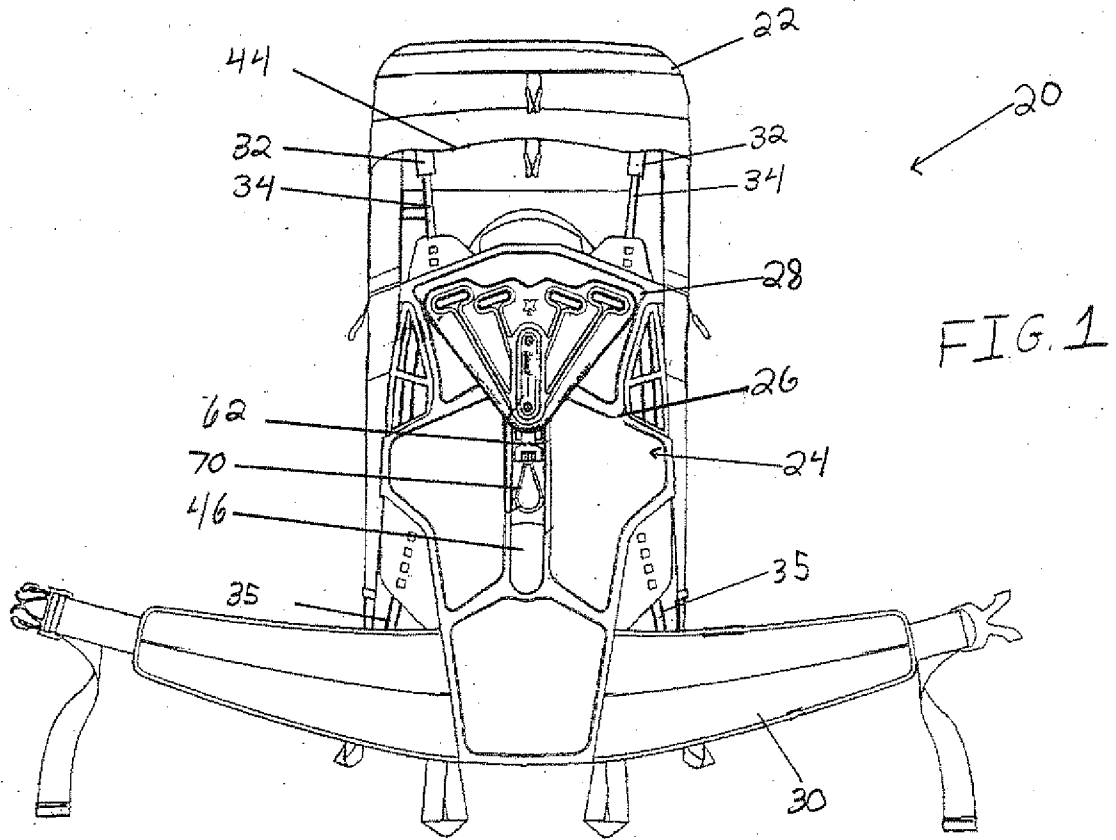
10. An apparatus for adjusting the position of shoulder straps on a backpack as set forth in claim 9, wherein the slider is free to move along the

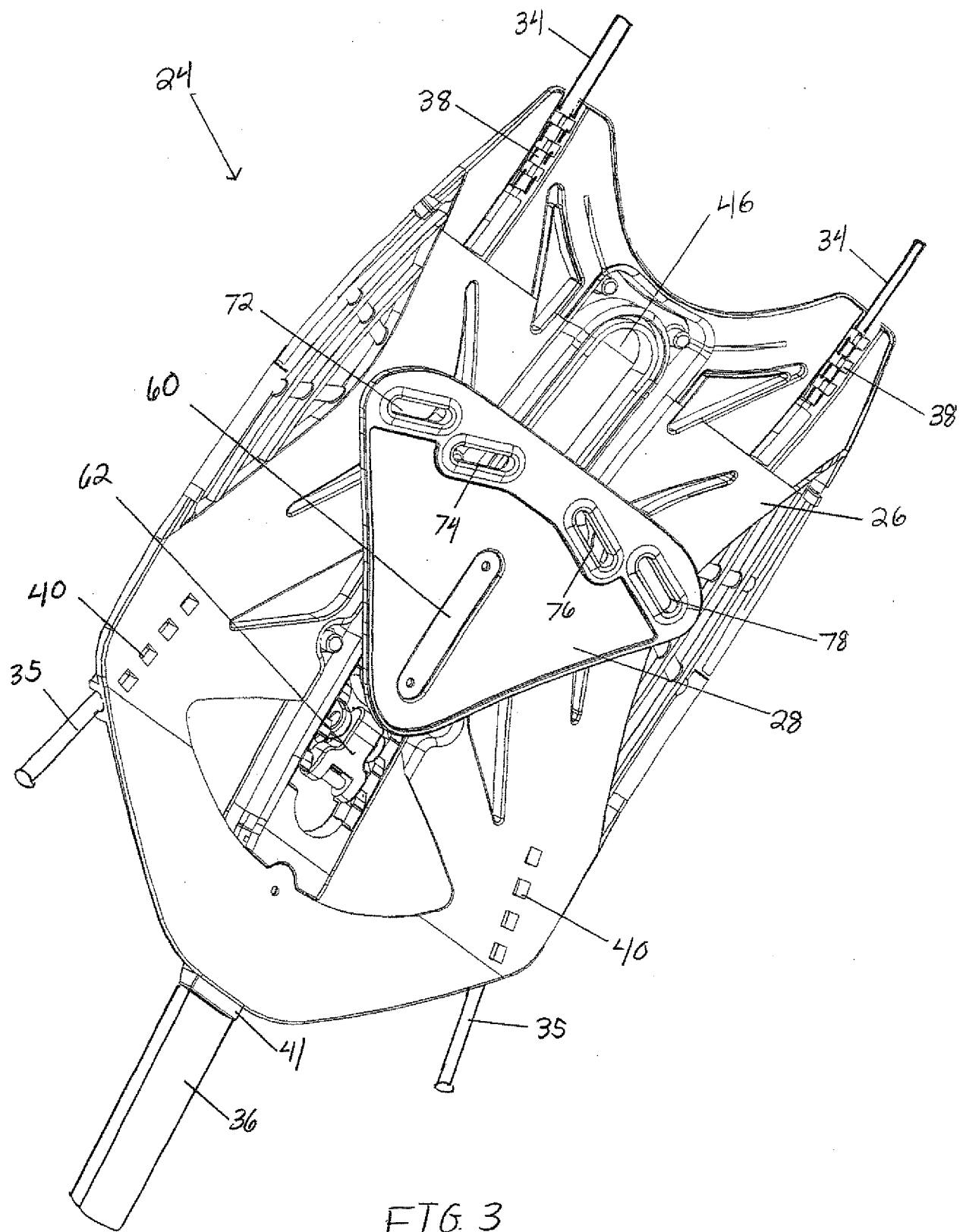
longitudinal length of the center channel when the locking mechanism is in the locked position.

11. An apparatus for adjusting the position of shoulder straps on a  
5 backpack as set forth in claim 10, wherein the position of the slider is fixed with respect to the center channel when the locking mechanism is in the locked position.

12. An apparatus for adjusting the position of shoulder straps on a  
10 backpack as set forth in claim 9, wherein the shoulder straps are connected to the slider.

13. An apparatus for adjusting the position of shoulder straps on a  
backpack as set forth in claim 9, further comprising a yoke attached to the  
15 slider, the yoke including shoulder strap attachment points, wherein the shoulder straps are connected to the shoulder strap connection points.





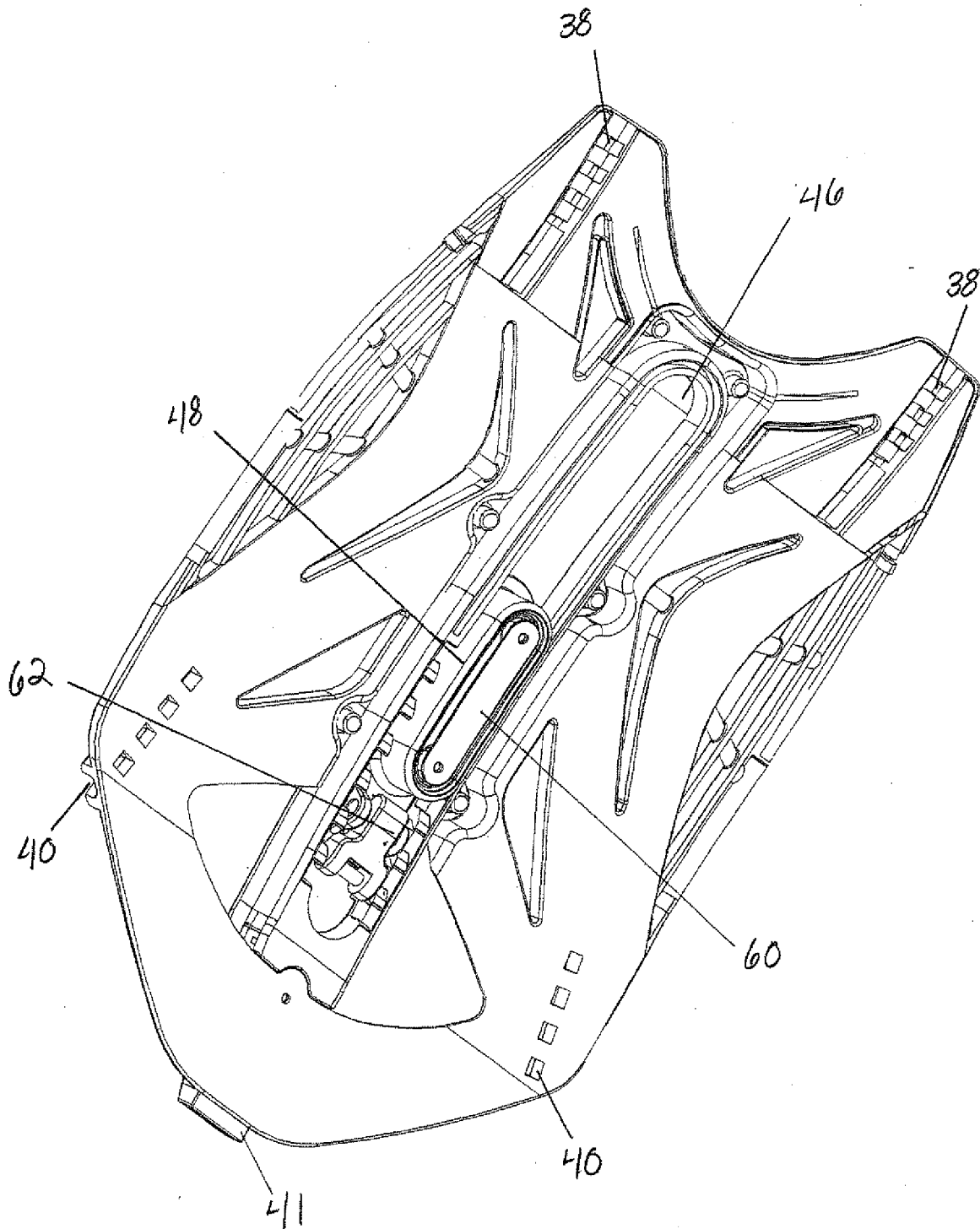


FIG. 4

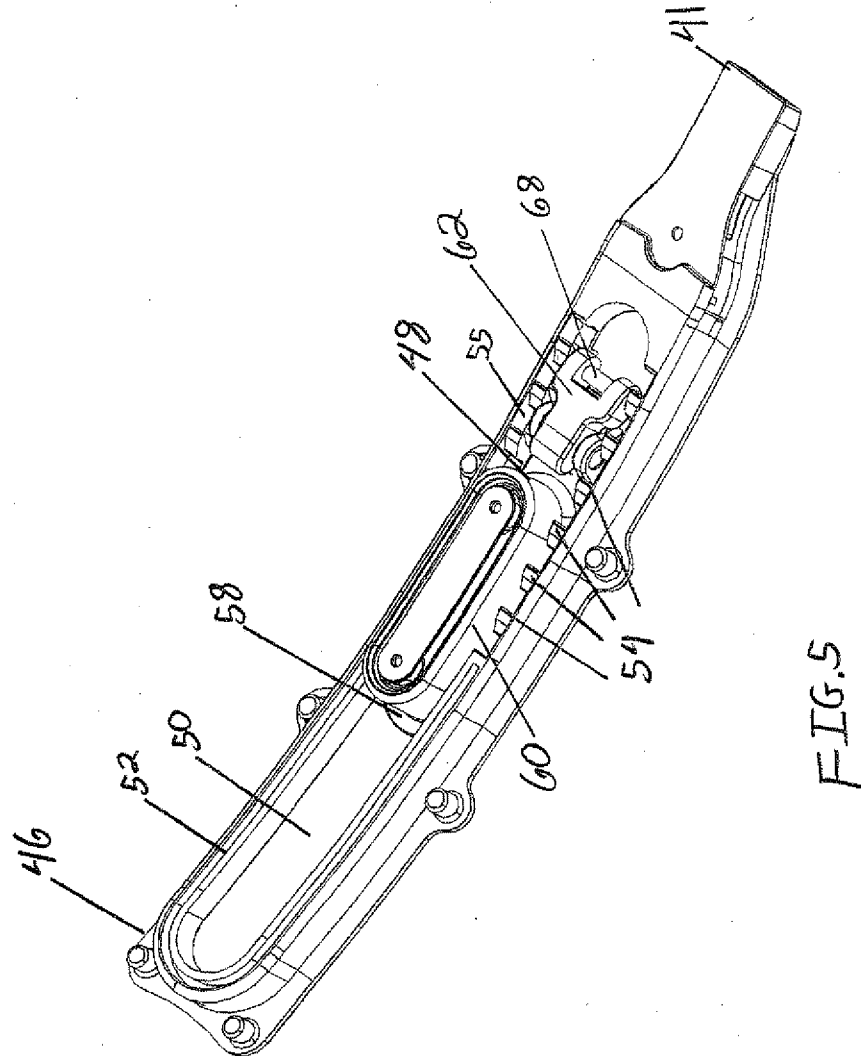


FIG. 5

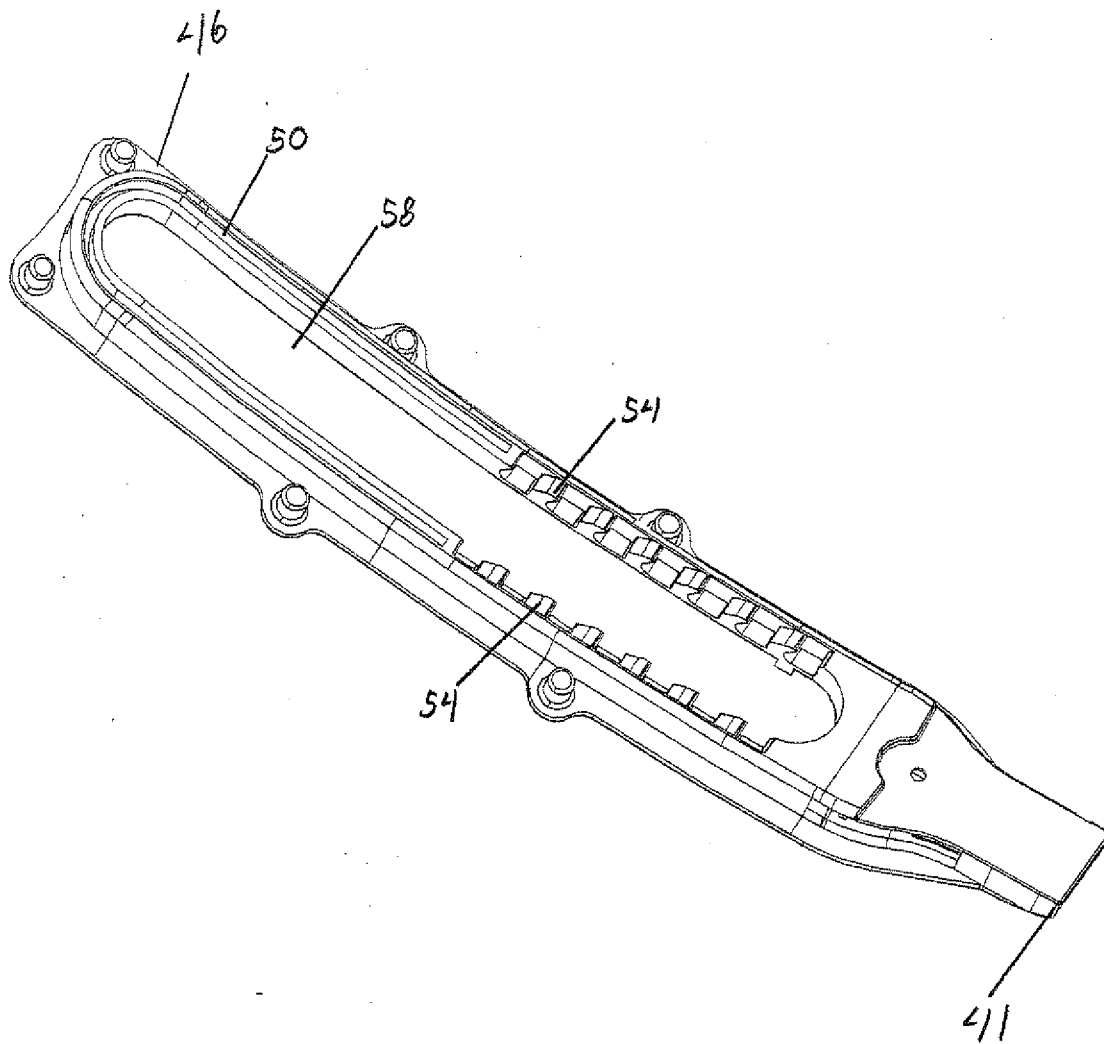


FIG. 6

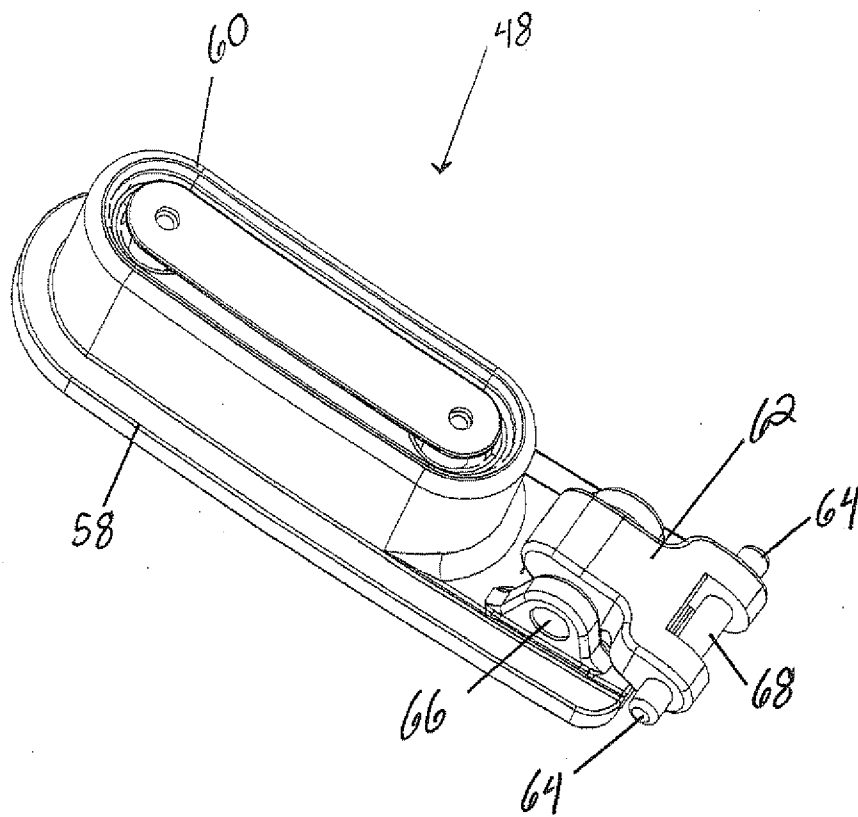


FIG. 7

FIG. 8

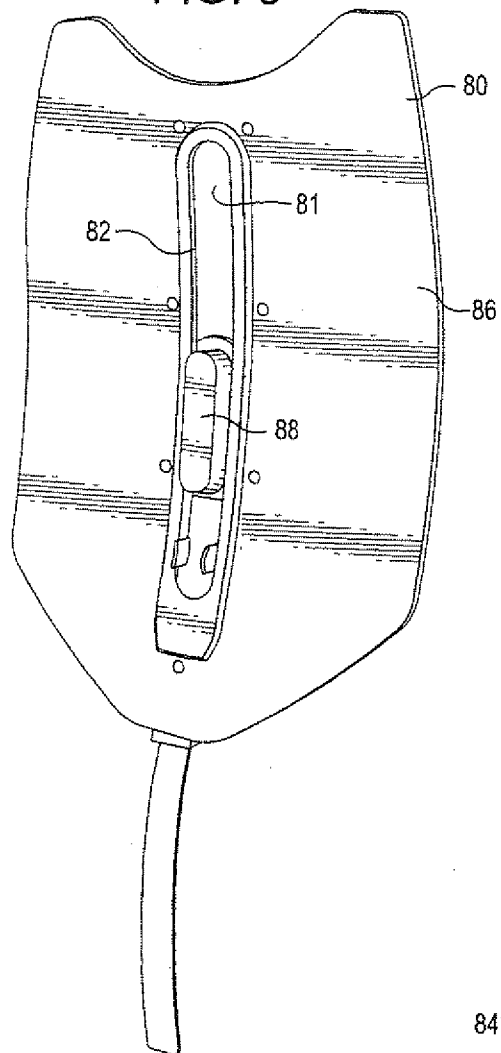
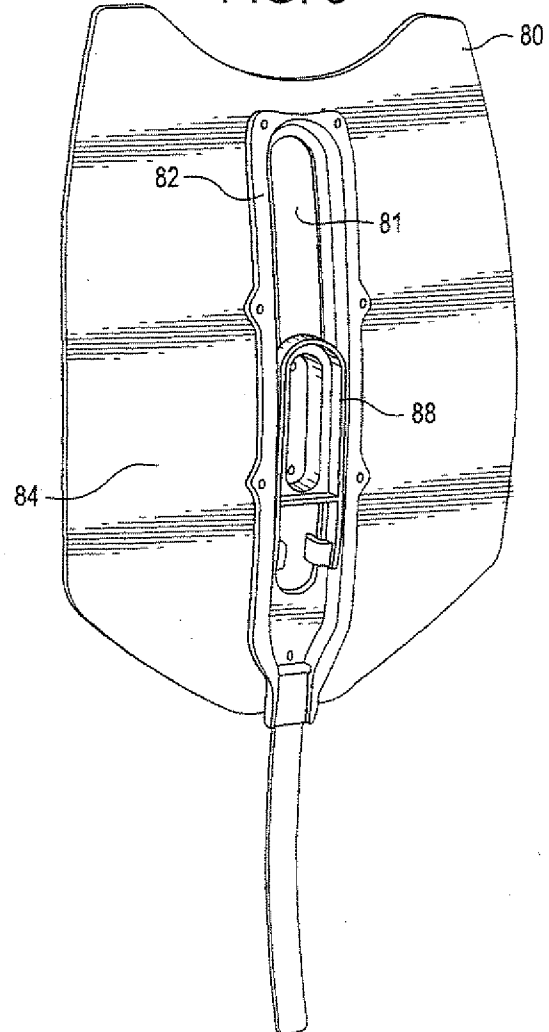


FIG. 9



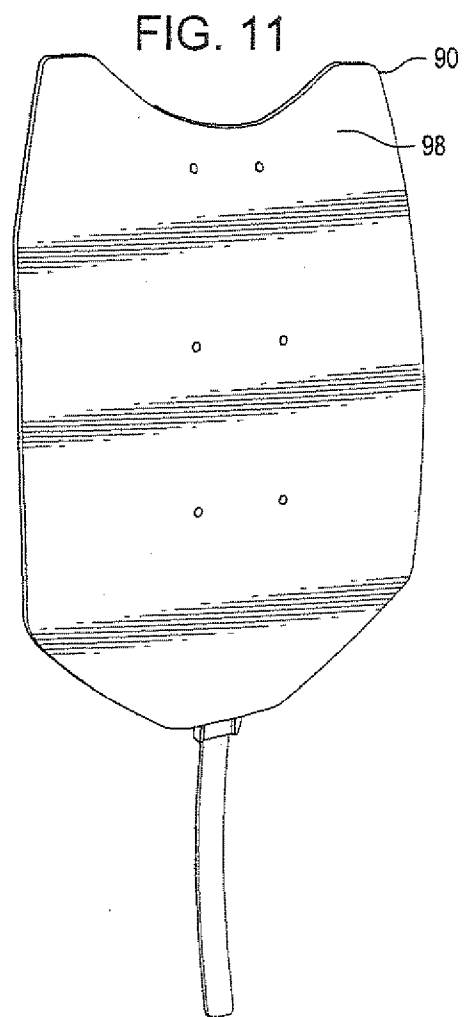
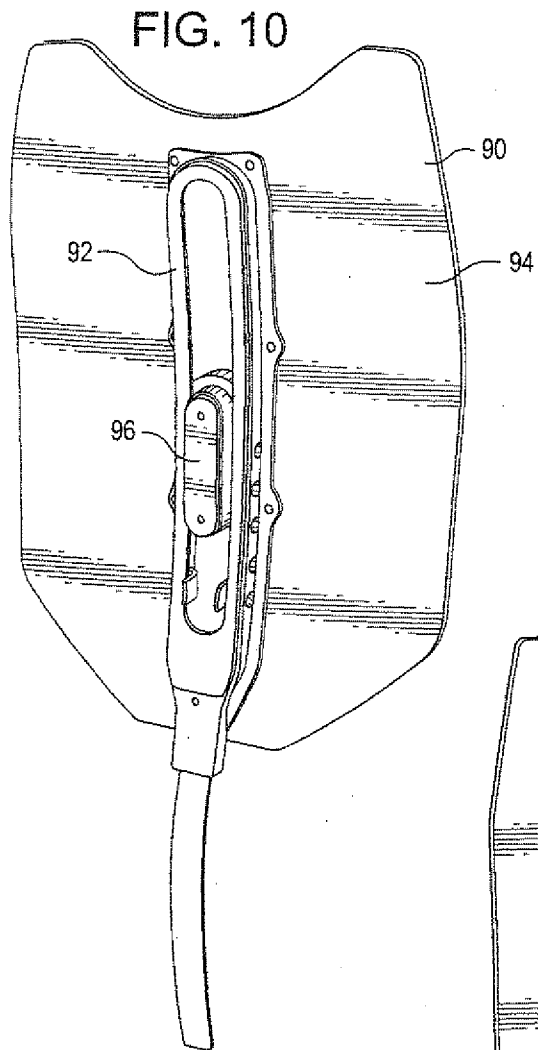


FIG. 12

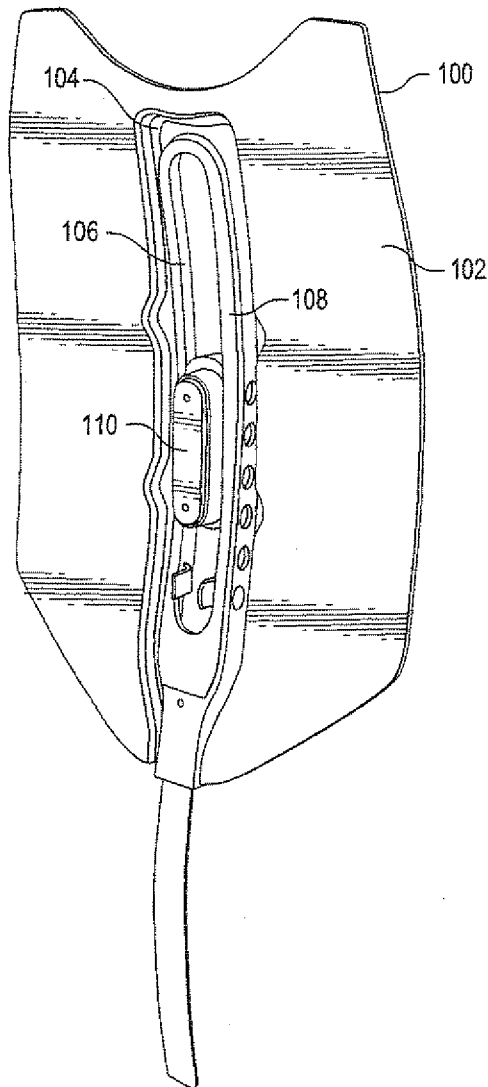


FIG. 13

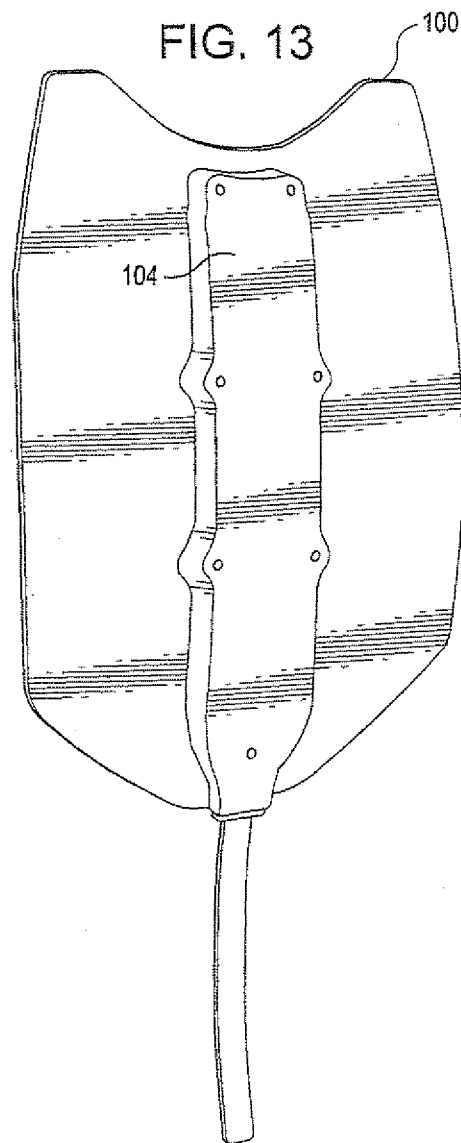
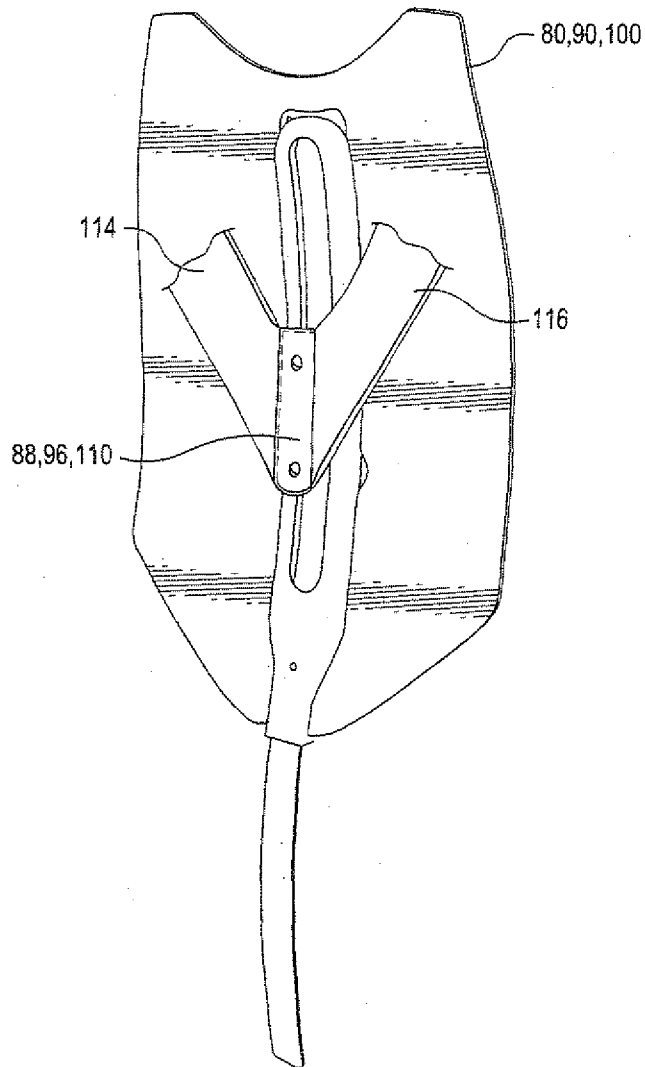


FIG. 14



## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/US2008/077547****A. CLASSIFICATION OF SUBJECT MATTER***A45F 3/04(2006.01)i, A45F 3/14(2006.01)i*

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 A45F

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

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PAJ, FPD, USPAT, eKIPASS(KIPO internal) "Keyword: sack, backpack, shoulder strap, slider, zipper, length adjustable and similar terms"

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                            | Relevant to claim No. |
|-----------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| A         | US 6,138,881 A ( PAUL, JEANNE et al. ) 31 OCTOBER 2000<br>See abstract; figure 1; claims 1-11.                                | 1-13                  |
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Further documents are listed in the continuation of Box C.



See patent family annex.

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

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