(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 387 908 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
23.11.2011 Bulletin 2011/47

(51) Int Cl.:
A45F 3/04 *(2006.01)* ***A45F 3/06*** *(2006.01)*

(21) Application number: **11166402.5**

(22) Date of filing: **17.05.2011**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **17.05.2010 US 345344 P**

(71) Applicant: **BAE Systems Speciality Defense Systems of Pennsylvania, Inc.**
Jessup PA 18434 (US)

(72) Inventors:
- **Darnell II, Lloyd Bill**
  Phoenix, AZ 85044-5313 (US)
- **Johnson, Erik Matthew**
  Phoenix, AZ 85044-5313 (US)

(74) Representative: **Burrows, Anthony Gregory**
Business Centre West
Avenue One, Business Park
Letchworth Garden City
Hertfordshire SG6 2HB (GB)

(54) Backpack

(57) A backpack 10 can be used in many different configurations and is adaptable to support numerous attachments and accessories so as to support, for example, a soldier for up to five days or more. A main pack body 12 includes a large main compartment 20 and upper and lower sewn-on secondary compartments 22 and 24 on the backside of the pack 10. Two detachable side pouches 14 may be provided, as well as a detachable bottom compartment 16. A suspension system includes a waist belt 160 and a shoulder strap system 194.

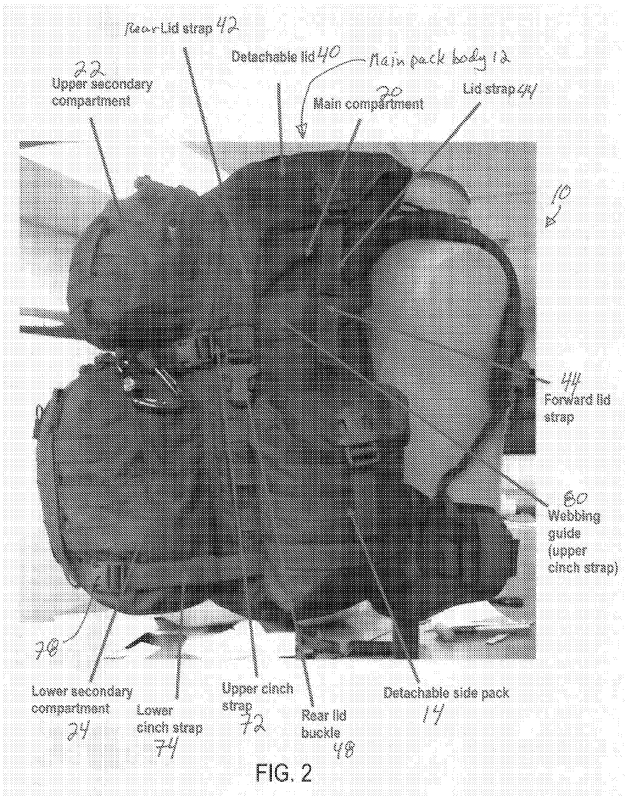

FIG. 2

EP 2 387 908 A2

Description

[0001] This invention relates to a backpack, for example a 5-day combat backpack.

[0002] According to a first aspect of the present invention, there is provided a backpack for use by a wearer, comprising:-

a main compartment; and
a secondary compartment that is substantially permanently connected on a back of the main compartment;
the secondary compartment including a slide/zip closure; and
the secondary compartment including a cinch strap to enhance its structural capability and to reduce the failure potential of the slide/zip closure.

[0003] According to a second aspect of the present invention, there is provided a backpack for use by a wearer, comprising:-

a main compartment;
an upper secondary compartment that is substantially permanently connected on a back of the main compartment; and
a lower secondary compartment that is substantially permanently connected on said back, below the upper secondary compartment;
the lower secondary compartment being spaced downward from the upper secondary compartment by a distance sufficient to create a rifle channel so that a rifle can be carried transversely on said back.

[0004] According to a third aspect of the present invention, there is provided a backpack for use by a wearer, comprising:-

a main compartment, and
two detachable side pouches each having mounting straps that interface with PALS [Pouch Attachment Ladder System] webbing on the main compartment to support the side pouches on the main compartment.

[0005] According to a fourth aspect of the present invention, there is provided a backpack for use by a wearer, comprising:-

a main compartment, and
a detachable lid that is connectable to the main compartment by lid straps and buckles, the lid also having a hook-and-loop fastener connection to the main compartment by which the lid can be hingedly connected to the main compartment when the lid straps and buckles are disengaged.

[0006] A preferred embodiment of the present invention is a backpack that can be used in many different configurations and is adaptable to support numerous attachments and accessories so as to support, for example, a soldier for up to five days or more. The main pack body includes three compartments, namely one large main compartment and two sewn-on, secondary compartments (one upper, one lower) on the backside of the pack. Two detachable side pouches may be provided. Also, a detachable bottom compartment may be provided.

[0007] In order that the invention may be clearly and completely disclosed, reference will now be made, by way of example, to the accompanying drawings, in which:-

Figures 1 and 2 are general views of a combat backpack;

Figure 3 is a view of the inside of a main compartment thereof;

Figure 4 is a view of a lid of the pack;

Figure 5 is a view of the underside of the pack lid and an integral pocket;

Figure 5 is a view of the front edge of the pack lid with overlapping straps;

Figure 6 is a view of the flaps in the closed orientation;

Figure 7 is a view of the flaps in the gap orientation;

Figure 8 is a view of a spindrift collar of the pack;

Figure 9 is a view of a bottom panel of the main compartment;

Figure 10 is a view of webbing loops and upper cinch strap buckles of the pack;

Figure 10A is a view of a front panel of the pack with suspension system removed;

Figure 11 is a view of an upper secondary compartment;

Figure 12 contains a view of the inside of the upper secondary compartment;

Figure 13 is a view of the upper secondary compartment;

Figure 14 is a view of the inside of a lower secondary compartment;

Figure 15 is a view of the lower portion of the lower secondary compartment and a lower cinch strap

buckle connection;

Figure 16 is a front view of a detachable side pouch of the pack;

Figure 17 is a back view of the detachable side pouch;

Figure 18 is a front view of a waist belt of the pack;

Figure 19 is a back view of the waist belt;

Figure 20 is a view of diagonal reinforcing straps for the belt;

Figure 21 is front view of a shoulder strap system of the pack;

Figure 22 is a back view of the shoulder strap system;

Figure 23 is a view of the pack with suspension system directly attached;

Figure 24 is a view of the pack and suspension system attached to a 1606 air assault frame;

Figure 25 is a view of the back of the 1606 air assault frame with the suspension system attached; and

Figures 26 to 29 are views of a detachable bottom compartment of the pack.

[0008] The drawings illustrate a backpack 10 which is medium-sized and includes a main pack body 12. The main pack body 12 consists of 3 compartments--one large main compartment 20, and two sewn-on, secondary compartments (one upper 22, one lower 24) on the backside of the pack 10. The volume of the main pack body 12 is approximately 3100 cubic inches.

[0009] Two detachable side pouches 14 are provided. The side pouches 14 are approximately 100 cubic inches each in volume. A detachable bottom pouch 16 (Figs. 26-29) is larger in volume, approximately 400 cubic inches.

[0010] Figures 1 and 2 are views of the pack 10 with various features and components labelled. The two detachable side pouches 14 are shown attached to the backpack 10. The larger detachable bottom pouch or bottom compartment 16 is shown in Figs. 26-29.

[0011] The pack 10 itself does not include an internal or external frame, but is compatible with existing external frames. Thus, the pack 10 can be used alone, or with an external frame. One preferred frame is sold by Down East Inc. as #1606 MOLLE Pack Frame [MOLLE = Modular Lightweight Load-carrying Equipment].

[0012] The main compartment 20 (Figs 1-3) spans the entire height of the pack. The main compartment 20 includes, on its inside, a pocket 30 (Fig. 3) on the front side 32 (user side) of the compartment. The pocket 30 runs the entire height of the main compartment 20 and is sized to fit a radio or M8 mortar base plate. The pocket 30 is open to the top and its contents are retained via a single, centrally located cinch strap 34.

[0013] The main compartment 20 is closed from the environment by an integral spindrift collar 36 (a cover that can be shut with a drawstring), as well as by a separate detachable lid 40. Figures 4 and 5 show the pack lid 40. The detachable lid 40 is secured to the pack via four lid straps 42, 44 on the sides, and a strip of hook fastener tape 46 along the front (user side) edge and rear edge of the lid. The two rear lid straps 42 are located on the lid 40 itself, and engage rear lid buckle connectors 48 (Fig. 2) on the pack; the two forward lid straps 44 are located on the pack, and engage connectors 50 (Fig. 4) on the lid 40. The hook fastener strip 46 on the lid 40 interfaces with a matching loop strip sewn to the front 32 (user-facing) and rear panels 54 of the main compartment 20. The hook-and-loop connection allows the lid 40 to hinge forward when the four lid straps 42, 44 are released and the rear hook-and-loop connection is disengaged.

[0014] The lid straps 42, 44 are adjustable at their buckle connections to accommodate different sizes of internal contents for the main compartment 20, while allowing the pack 10 to be cinched down to minimize (conform) its volume to its internal contents. The rear lid straps 42 are formed by shaped panels 56 (Fig. 4) of material integral to the lid 40 that are sewn to webbing straps. The rear lid straps 42 connect to buckles 48 sewn to the side panels of the main compartment 20 just below the upper cinch straps 72. The forward lid straps 44 are made from webbing sewn directly to the side panels just below the upper cinch straps 72, and attach to the lid 40 via a buckle 50 sewn directly to the lid.

[0015] The detachable pack lid 40 (Fig. 4) incorporates PALS [Pouch Attachment Ladder System] -compatible (or MOLLE-compatible) webbing 58 on its top, external surface to facilitate the attachment of accessories. Specifically, sufficient PALS webbing 58 is incorporated to enable the attachment of a hydration carrier.

[0016] Figure 5 is a view of the underside of the pack lid 40. To enhance the functionality of the detachable lid 40, the lid incorporates on its underside an integral pocket 60. The pocket 60 is substantially the same size as the lid 40, and has an opening along the front (user-side) edge that is closed via hook-and-loop tape 62. This pocket 60 can be used for storage of miscellaneous accessories. In addition, because the lid 40 is detachable, the pocket 60 can be filled with necessities and the lid used as an escape and evasion pack when the entire backpack 10 cannot be carried.

[0017] The lid 40 (Figs. 5-6-7) incorporates overlapping flaps 64, 65 at the forward (user-side) sides of the lid that engage each other with hook-and-loop tape. These flaps 64, 65, when opened at least partially, accommodate the pass through of radio antennas or other

accessories that may be contained within the main compartment 120. These flaps 64, 65 create the front corners of the lid 40, but can be disengaged to create a small gap or opening 66 in the front, outer corners of the lid. Figures 5, 6, and 7 contain views of the front edge of the pack lid 40 with the overlapping flaps 64. Figure 6 shows the flaps 64, 65 in the closed orientation, and Figure 7 shows the flaps in the gap (open) orientation.

[0018] The pack 10 can be used without the detachable lid 40. To that end, the pack 10 includes a large spindrift collar 36 (Fig. 8) that is sewn to and closes off the main compartment 20. The spindrift collar 36 allows the main compartment 20 to be closed off via a drawstring 70 at the collar's upper perimeter. The spindrift collar 36 also maximizes the water resistance of the main compartment 20, as it leaves a minimal opening to the main compartment when cinched. The spindrift collar 36 extends approximately 7.5 inches above the top edge of the main compartment 20. The flexibility and length of the spindrift collar 36 allow the pack 10 to expand in volume above the main compartment 20, and to accommodate items that are taller/longer than the main compartment.

[0019] In addition to the vertical volume control via the lid straps, the size of the main compartment 20 can also be adjusted horizontally (laterally) via upper and lower cinch straps 72, 74 (Fig. 2) on either side of the pack. This allows the main compartment 20 to be cinched in a horizontal fashion to minimize (conform) its volume to its internal contents. The upper and lower cinch straps 72, 74 are also designed to enable the pack 10 to be mounted onto an external frame, and serve as the primary interface with the frame. In particular, the pack 10 and straps 72, 74 are designed to interface with the Downeast, Inc., Model 1606 air assault frame. The cinch straps 72, 74 are still usable in their primary cinch function when the pack 10 is attached to an external frame.

[0020] The upper cinch strap 72 runs nearly horizontally slightly above the midline of the main compartment 20. The strap 72 anchors to a webbing strap via adjustable buckles 76 (Fig. 10) on the back (rear-facing) panel of the main compartment 20 between the upper and lower secondary compartments 22, 24, at either end. The upper cinch strap 72 runs continuously from one side around the front (user-facing) panel of the pack 10 and back to the other side, connecting to the webbing strap via the adjustable anchor buckle 76. The lower cinch strap 74 (Fig. 2) runs horizontally near the bottom edge of the pack 10 and anchors to the back (rear-facing) panel of the lower secondary compartment 24 on one end via an adjustable buckle 78, and on the other end to the front (user-facing) panel of the main compartment via a sewn connection.

[0021] The cinch straps 72, 74 can be tightened and the main compartment 20 compressed down to its contents by the user pulling forward (toward the front panel) on the length of free webbing strap. Conversely, the cinch straps 72, 74 can be loosened by rotating the forward edge of the appropriate buckle 76, 78 about the vertical axis toward the back, releasing the frictional lock action of the webbing adjuster and then pulling on the tensioned length of strap to relieve tension and create slack.

[0022] The external side panels of the main compartment include webbing guides 80 (Fig. 2) for the upper cinch strap 72, as well as PALS-compatible webbing 82--one row in the upper area of the side panel for small accessories, and four rows at the bottom of the side panel for attachment of the side pouches 14 or other PALS-compatible accessories. The PALS webbing 82 and the upper cinch strap webbing guide 80 are shown in Figures 1 and 2.

[0023] Figure 9 shows the bottom (ground-facing) panel 90 of the main compartment 20. The bottom panel 90 incorporates additional rows of PALS-compatible webbing 92, oriented fore-aft. Two rows are situated near the side, with an additional two rows on either side of the centreline of the pack. Two additional mounting straps 94 are provided on the bottom panel 90 of the pack between the PALS-compatible webbing 92, on either side of the pack centreline. The additional straps 94 are constructed from a combination of 1-inch and 2-inch webbing and allow accessories to be attached to the pack. Specifically, they are designed to enable the detachable bottom compartment 16 (Figs. 26-29) to be attached to the main pack compartment 20 of the pack 10.

[0024] Figure 10 shows the webbing loops and upper cinch strap buckles of the main pack body 12. The back panel (rear-facing) of the main compartment supports the removable upper (22) and lower (24) secondary compartments, as well as the upper cinch strap buckles 76. The cinch strap buckles 76 are anchored to the back panel near the side panels. The back panel also incorporates a strip of webbing 96 with four large loops for attachment of accessories in between the two upper cinch strap anchor points.

[0025] Figure 10A shows the front (toward the wearer) panel 100 of the pack 10 (the pack's suspension system, described below, is removed). A strip of loop fastener tape 102 is sewn to the upper, centre portion of the front panel. This strip connects with the hook fastener tape 46 on the front detachable edge of the lid 40, to provide a releasable hinge connection between the lid and the main compartment 20 when the lid straps 42, 44 are disconnected.

[0026] To facilitate attachment of the pack's suspension system (described below), the front panel 100 incorporates sewn webbing loops with attached webbing adjusters 104 near the top of the main compartment 20. These provide mounting locations for shoulder strap control connections that connect near the top apex of the shoulder straps. The webbing loops 104 are sewn directly on top of the portion of the top carry handle 106 that is sewn to the front panel on either side of the vertical centreline.

[0027] To interface with the bottom end of the chest-side of the shoulder straps, the front panel 100 incorpo-

rates D-rings 108 near the bottom edge of the front panel near the side panels. Directly adjacent to the shoulder strap D-rings 108, the front panel also incorporates anchor points for the lower cinch strap 74, as well as two webbing adjusters 110 for use with an external frame. The lower cinch strap 74 is sewn to the front panel 100. The webbing adjusters 110 allow the lower cinch strap 74 to be tightened around the frame while leaving the remaining length of webbing usable as a cinch strap.

[0028] Similarly, the front panel 100 incorporates sewn anchor points for the continuous upper cinch strap 72 near the midline of the front panel. This is necessary as the upper cinch strap is utilized to attach the shoulder straps when the suspension system is used without an external frame.

[0029] Padding is sewn into the front panel 100 of the main compartment 20 to facilitate carrying hard body armour plates and/or other similarly accessories. The padding preferably has an upside down U-shape and runs from approximately the midline of the back near the sides up to the top; around to the middle of the front panel; over to the other side; and then back down symmetrically to the middle of the front panel 100. The padding is preferably a strip of padding approximately 2 inches wide.

[0030] To accommodate the waist belt 160 (described below), the front panel 100 incorporates a lateral pocket 114 near the bottom of the front panel. The lateral pocket 114 is a panel of fabric sewn to the front panel 100 with openings at the side of the pocket, as well as the top, to enable the backside of the shoulder straps 194 to connect to the waist belt 160.

[0031] The front panel 100 also includes an upper pocket 116 near the top edge of the panel to enable the use of an external frame. The upper pocket 116 is a panel of fabric sewn to the front panel with an opening that faces down, and having a cut-out in the upper edge to allow the shoulder strap control connections to pass through. In particular, the upper pocket 116 is designed to interface with the Downeast, Inc., 1606 air assault frame.

[0032] The front (user-facing) panel incorporates three carry handles--one top carry handle 106 and two side carry handles 118. The top carry handle 106 is located at the top of the front panel, just below the loop fastener strip 102 that interfaces with the lid 40, and is sewn to the front panel directly underneath the webbing loops. The side carry handles 118 are located just below the upper cinch strap 72. For maximum structural performance, the webbing that forms the side carry handles 118 is continuous and spans the entire width of the front panel 100 as shown in dashed lines in Figure 10A, and is sewn to the inside of the main compartment 20. The position and structural nature of the side carry handles 118 allow the pack 10 to be carried on its side, but also allow a disabled wearer to be moved efficiently by two persons each grasping a side carry handle 118 in an improvised litter carry, lifting the pack 10 directly and, indirectly thereby, the wearer of the pack 10.

[0033] The upper secondary compartment 22 is shown in Figures 11 and 12. The upper secondary compartment 22 is located on the upper back (rear-facing) surface of the main compartment 20 and is sewn directly to the main compartment. The approximate dimensions (in inches) of the upper secondary compartment 22 are 13w x 7h x 5d. The upper secondary compartment 22 is accessed via a slide/zip closure 120 that runs around the upper half of its rearmost perimeter.

[0034] Figure 12 shows the inside of the upper secondary compartment. The upper secondary compartment 22 includes a mesh pocket 122 attached to the inside of the rear-facing panel of the upper secondary compartment. The mesh pocket 122 runs the full width of the compartment 22 and is approximately 5.5 inches tall. Two snaps 124 are provided on the inside panel of the compartment to enable a 6 magazine bandoleer to be mounted inside.

[0035] The rear-facing surface (Fig. 11) of the upper secondary compartment 22 incorporates three rows of PALS webbing 126 to enable the attachment of PALS-compatible accessories or other hardware. In addition, a 1-inch strip of loop fastener tape 128 is sewn onto the rear-facing surface of the pocket to enable identification or other information to be attached to the pack as necessary. The tape strip 128 runs laterally across the rear-facing panel of the compartment between the first and second rows of PALS webbing 126.

[0036] The upper secondary compartment 22 incorporates vertical cinch straps 130. The lower ends of the vertical cinch straps 130 are sewn to the main compartment just below the upper compartment 22. The upper ends of the vertical cinch straps 130 connect to buckles 132 on the main compartment 20 at the top of the pocket 122. The cinch straps 130 enable the upper secondary compartment 22 to be cinched down to minimize (conform) its volume to its internal contents. The cinch straps 130 also provide structural support to the slide/zip closure 120 of the upper secondary compartment 22. The lateral location of the vertical cinch straps 130 is such that they can be run underneath the rows of PALS webbing 126, helping to reduce entanglement potential.

[0037] The lower secondary compartment 24 is shown in Figures 13-15 and is similar in construction to the upper secondary compartment 22. The lower secondary compartment 24 is located on the lower back (rear-facing) surface of the main compartment 20 and is sewn directly to the main compartment approximately 2 inches below the upper secondary compartment 22. This separation between the lower secondary compartment 24 and the upper secondary compartment 22 provides a gap for receiving accessories or for allowing a rifle to be nested between the two compartments 22 and 24.

[0038] Figure 14 is a view of the inside of the lower secondary compartment 24. The approximate dimensions (in inches) of the lower secondary compartment 24 are 15w x 12h x 7d. The lower secondary compartment 24 is accessed via a slide/zip closure 136 (Fig. 14) that

runs around the upper half of its rearmost perimeter.

[0039] The lower secondary compartment 24 includes a mesh pocket 138 sewn to the inside of the rear-facing panel of the compartment 24. The mesh pocket 138 runs the full width of the compartment and is approximately 6.5 inches tall. Two snaps 140 are provided on the inside panel of the compartment 24 to enable a 6 magazine bandoleer to be mounted inside.

[0040] Figure 15 is a view of the lower portion of the lower secondary compartment 24 and the lower cinch strap buckle connection. The rear-facing surface of the compartment 24 incorporates three rows of PALS webbing 142 to enable the attachment of PALS-compatible accessories or other hardware. The bottom row of PALS webbing 142 is used as the anchor point for the lower cinch strap buckles 78.

[0041] A 2-inch strip of loop fastener tape 144 (Fig. 13) is sewn onto the rear-facing surface of the compartment 24 to enable identification or other information to be attached to the pack 10 as necessary. The tape strip 144 runs laterally across the rear-facing panel of the compartment above the PALS webbing 142.

[0042] The lower secondary compartment 24 incorporates two vertical cinch straps 146. The vertical cinch straps are anchored just below the compartment and connect to buckles at the top of the compartment 24. The cinch straps 146 enable the compartment 24 to be cinched down to minimize (conform) its volume to its internal contents, as well as to provide structural support to the slide/zip closure 136. The lateral location of the vertical cinch straps 146 is such that they can be run underneath the PALS webbing 142 helping to reduce entanglement potential.

[0043] The pack 10 includes two identical detachable side pouches 14. Figure 16 shows a front view of a detachable side pouch 14, and Figure 17 a back view. The pouches 14 are approximately 9h x 7w x 4d in size (in inches) and include attachment webbing 149 that interfaces with the PALS webbing on the lower part of the main compartment side panels.

[0044] Each side pouch 14 has a top flap closure 150 that is secured via a snap buckle that includes a female buckle end 154 mounted to the flap 150 and a male buckle end 156 adjustably attached to the front side of the pouch 14 via a webbing strap. The pouch 14 is sized to accommodate standard sustainment rations or other miscellaneous items. The pouch 14 incorporates two rows of PALS-compatible webbing 158 on its vertical, external face.

[0045] The detachable bottom compartment 16 (Figs. 26-29) is generally similar in configuration to the detachable side pouch and is designed to interface with the PALS-compatible webbing 92 and the 2-inch straps 94 located on the bottom panel of the main compartment 20. The detachable bottom compartment 16 is approximately 13h x 9w x 5d in size (in inches) and is sized to carry a set of boots, a sleep system, or other miscellaneous equipment.

[0046] The detachable bottom compartment 16 is accessed via a slide/zip closure 230 that runs around the upper half of its rearmost perimeter. The detachable bottom compartment 16 incorporates two cinch straps 232. The cinch straps 232 are anchored to the forward (user-facing) top (facing the bottom of the main compartment 20) surface of the bottom compartment 16 and loop around the entire circumference to connect to buckles 234 on the rear-facing portion of the top surface. The cinch straps 232 enable the compartment to be cinched down to minimize its volume to its internal contents, as well as provide structural support to the slide/zip closure 230. This structural support enables the compartment to be filled to capacity while reducing the potential for failure of the slide/zip closure 230.

[0047] The detachable bottom compartment 16 also includes two laterally extending snap-fastener straps 236. The straps 236 when disengaged can be slid through the 2 inch webbing 94 on the bottom of the main compartment 20 and then snapped closed, to support the bottom compartment 16 on the main compartment 20. The straps 236 can also be connected through standard PALS webbing. Thus, the detachable bottom compartment 16 is PALS-compatible and can be attached to any PALS-compatible equipment.

[0048] The pack 10 includes a suspension system that includes two main components--a waist belt or load distribution belt 160 and a shoulder strap system 190. Figures 18 and 19 are front and back views of the waist belt 160. The waist belt 160 includes an internally-padded belt 161 with 2-inch wide webbing straps 162 extending from either end that connects with a buckle system 162, 164. The padding is provided on the portion of the belt 161 that sits on the user's back, and extends around to the hip area. The length of padding is approximately 30 inches. The profile and top and bottom edges of the waist belt 160 are contoured to provide maximum comfort for the user while maintaining compatibility with body armour.

[0049] To retain the loose ends of the webbing 162 and to enable the waist belt 160 to be tightened in both forward and rearward pull directions, the webbing 162 passes through a 2-inch D-ring 168 on each side after passing through the adjustable buckle 162, 164. The D-rings 168 are sewn into the waist belt 160 near the end of the padded portion.

[0050] The waist belt 160 attaches to the main pack body 12 by sliding laterally through the lower pocket 114 (Fig. 10A). Vertical (downward) loads are transmitted from the main pack 12 to the waist belt 160 and thereby to the wearer's waist and hips.

[0051] The waist belt 10 incorporates a pair of diagonal reinforcing straps 170 (Fig. 20) on either side in the hip area to help carry the vertical loads into the cantilevered portion of the waist belt in the hip area of the user, while minimizing twist in the waist belt. The straps 170 are sewn to the back (pack-facing) side of the waist belt 160 and are anchored adjacent to the point at which the waist belt

is loaded by the pack or where the waist belt is connected to an external frame. The straps 170 begin at the top and bottom edges of the waist belt 160 and converge diagonally to the waist belt webbing anchor point and tightening D-ring 168. A 2-inch piece of webbing 172 reinforces the connection at one end and a 1-inch piece of webbing 174 reinforces the connection adjacent to the pack/frame attachment.

[0052] The diagonal orientation of the straps 170 allows the top and bottom edges of the waist belt 160 to react well to vertical loads. In contrast, typical waist belt designs are constructed with a webbing strap centrally-located on the waist belt. Such a centrally-located strap tends to deform and roll the waist belt over when the waist belt system is loaded. The diagonal straps 170 are pretensioned before being sewn to the waist belt 160. This pre-tensioning helps the waist belt 160 better react vertical waist belt loads by removing potential slack, and also forces the belt sides into an open configuration that is more easily donned.

[0053] To facilitate attachment of the shoulder strap system 190 (described below), the waist belt 160 incorporates two shoulder strap D-ring connectors 176 (Fig. 20). The shoulder strap D-ring connectors 176 are sewn near the vertical centreline of the waist belt 160.

[0054] To facilitate attachment of the waist belt 160 to an external frame, the waist belt incorporates two additional strap connectors 180 (Fig. 19), one located on each side of the vertical centreline of the back (pack-facing) side. Each strap connector 180 includes a webbing loop and a webbing adjuster

[0055] As it is desirable to drive as much of the pack load as possible to the waist belt 160, the pack 10 includes a shoulder strap system 190 that connects directly to the waist belt 160 instead of directly connecting to the main pack body 12. Figures 21 and 22 are front and back views of the shoulder strap system 190. Figure 23 is a view of the pack 10 with the shoulder strap suspension system 190 directly attached.

[0056] The shoulder strap system 190 includes a padded central support 192 and two padded shoulder straps 194. The central support 192 is designed to sit directly on the user's back, inside the pack itself. The central support 192 incorporates four webbing straps 196 on its back (pack-facing) side with integral webbing adjusters 198 that enable the pack 10 to be directly connected to an external pack frame. In particular, the straps 196 are designed to interface with the Downeast, Inc., 1606 air assault frame. Two of the webbing straps 196 are designed to engage the D-rings on the back (pack-facing) side of the waist belt. The webbing adjusters 198 enable the position of the central support 192 to be adjusted relative to the frame and/or waist belt 160 to accommodate a range of user sizes.

[0057] The shoulder straps 194 are sewn directly to the padded central portion 192 and extend at an angle outward from the centreline of the pack to the shoulder area of the user. The non-adjustable, padded section of the shoulder straps extends approximately 19 inches from the central support. The padded shoulder straps are reinforced over their length by webbing sewn onto their back/top/front (away from the user) surfaces. This webbing incorporates a loop 200 just above the central support that enables the shoulder straps 194 to engage the upper cinch strap 72 when no external frame is used. The webbing also enables the shoulder straps 194 to incorporate female quick-release buckles 202 at their ends that interface with corresponding male buckle connectors (with integral webbing adjuster) and webbing straps.

[0058] The shoulder straps 194 are designed to connect to the shoulder strap D-ring connectors 108 on the lower, outside portion of the main compartment back panel 100. The D-ring connection is made via a sewn loop in the shoulder strap webbing. The shoulder strap 194 is simply disconnected from the buckle 202 on the padded portion of the shoulder strap 194, the webbing loop is passed through the D-ring 100, and the male buckle is then passed through the webbing loop. The shoulder straps 194 are tightened via a length of webbing 210 that passes through the aforementioned integral webbing adjuster on the male buckle. The user pulls downward on each free webbing strap loop 210. Conversely, the shoulder straps 194 are loosened by pulling up on the free webbing strap loops and releasing the frictional lock action of the webbing adjuster 198. Each shoulder strap 194 can be adjusted independently of the other.

[0059] Although the primary vertical load path of the shoulder belt system 190 is through the waist belt 160 (in lieu of the pack 10), the shoulder belt system must also react the overturning moment of the offset pack load. To accomplish this, the shoulder straps 194 incorporate webbing control straps 212 that interface with webbing adjusters sewn to the front (user-facing) panel of the main compartment near the top. The control straps 212 are sewn to the padded shoulder straps 194 near the apex of the curve made when they are worn by a user. The adjustable connection between the front panel 100 of the main pack body 12 and the shoulder straps 194 enables the shoulder straps to react the overturning moment of the offset pack load, but also allows the user to adjust the amount of load transmitted to the shoulders as well as the orientation of the pack 10 relative to the shoulders. This adjustment allows the user to reposition the pack depending on terrain.

[0060] To help maintain the position of the shoulder straps 194 on the shoulders, the padded section of the shoulder straps incorporates a lateral strap system 214 that connects the two shoulder straps 194 in the chest area. This is accomplished with tensioned webbing loops 216 between the quick-release buckles 202 and the shoulder strap control webbing 212 at the shoulder curve apex. The lateral strap system 214 consists of two webbing straps--each with a loop 216, a webbing slide 218, and a buckle portion 220. The webbing loop 216 passes around the circumference of each padded shoulder strap

194 and is guided vertically by the webbing slides 218. The vertical adjustment allows the lateral strap system 214 to be adjusted depending on user height and preference.

[0061] For attachment of accessories, the shoulder straps 194 incorporate D-rings 222 that are anchored just above the lateral strap system 214 adjacent to the location where the shoulder control straps 212 attach to the shoulder strap 194. The area is reinforced with a strip of 2-inch webbing 224.

[0062] The pack 10 is designed to interface with an external frame system such as the Downeast, Inc., 1606 air assault frame. The frame interfaces with the main pack body 12 via the upper pocket 116 on the front (user-facing) pack panel, and the upper and lower cinch straps 72 and 74. When a frame is used with the pack 10, the suspension system is disconnected/disengaged from the pack and is connected to the frame, with the exception of the shoulder webbing control strap 212 connection which is retained. Figure 24 is a view of the pack and suspension system attached to the 1606 air assault frame. Figure 25 is a view of the back of the 1606 air assault frame with the suspension system attached.

[0063] The main pack body 12 and the detachable pouch bodies 14, 16 are constructed of Cordura Nylon fabric of various weights depending on expected wear and necessary strength. Alternative materials such as lightweight laminated and/or reinforced materials can also be used. Almost all of the webbing buckle and adjuster hardware is plastic and made by ITW Nexus. The padding utilized in the back panel of the main compartment, the shoulder strap system, and the waist belt is lightweight cross linked PE foams of different thicknesses and densities.

Claims

1. A backpack for use by a wearer, comprising:

a main compartment; and
a secondary compartment that is substantially permanently connected on a back of the main compartment;
the secondary compartment including a slide/zip closure; and
the secondary compartment including a cinch strap to enhance its structural capability and to reduce the failure potential of the slide/zip closure.

2. A backpack as set forth in Claim 1, wherein said secondary compartment is an upper secondary compartment and said backpack further comprises:-
a lower secondary compartment that is substantially permanently connected on said back, below the upper secondary compartment;
said lower secondary compartment including a slide/zip closure; and said lower secondary compartment including a cinch strap to enhance its structural capability and to reduce the failure potential of its slide/zip closure.

3. A backpack as set forth in claim 2, wherein the lower secondary compartment is spaced downward from the upper secondary compartment by a distance sufficient to create a rifle channel so that a rifle can be carried transversely on said back.

4. A backpack as set forth in any preceding claim and further including two detachable side pouches each having mounting straps that interface with PALS [Pouch Attachment Ladder System] webbing on the main compartment to support the side pouches on the main compartment.

5. A backpack as set forth in any preceding claim and further including a laterally extending waist belt pocket on the main compartment, and a waist belt that is extensible through the waist belt pocket and can be buckled around the waist of the wearer, to help carry the vertical loads of the backpack into the waist belt and thence into the hip area of the wearer.

6. A backpack as set forth in claim 5, wherein the waist belt includes internal padding and two diagonally extending reinforcing straps on either side to help carry vertical loads while discouraging twist in the waist belt.

7. A backpack as set forth in Claim 5 or 6, and further comprising a shoulder strap system that connects with the waist belt in a force-transmitting manner so that load on the waist belt is transmitted into the shoulder strap system.

8. A backpack as set forth in any preceding claim and further including a detachable lid that is connectable to the main compartment by lid straps and buckles, the lid also having a hook-and-loop fastener connection to the main compartment by which the lid can be hingedly connected to the main compartment when the lid straps and buckles are disengaged.

9. A backpack as set forth in claim 8, wherein the lid straps are adjustable in length to allow the pack to be cinched down while accommodating different volumes of internal contents in the main compartment.

10. A backpack as set forth in any preceding claim, wherein the main compartment includes a spindrift collar that can be shut with a drawstring.

11. A backpack as set forth in claim 1, wherein said secondary compartment includes rows of PALS webbing on its outer surface, and substantially vertical

cinch straps that can be run underneath the rows of PALS webbing to help to reduce entanglement potential.

12. A backpack as set forth in any preceding claim and further comprising a detachable bottom pouch having mounting straps that interface with PALS webbing on the main compartment to support said bottom pouch on the main compartment.

13. A backpack for use by a wearer, comprising:

a main compartment;
an upper secondary compartment that is substantially permanently connected on a back of the main compartment; and
a lower secondary compartment that is substantially permanently connected on said back, below the upper secondary compartment;
the lower secondary compartment being spaced downward from the upper secondary compartment by a distance sufficient to create a rifle channel so that a rifle can be carried transversely on said back.

14. A backpack for use by a wearer, comprising:-
a main compartment, and
two detachable side pouches each having mounting straps that interface with PALS webbing on the main compartment to support the side pouches on the main compartment.

15. A backpack for use by a wearer, comprising:-
a main compartment, and
a detachable lid that is connectable to the main compartment by lid straps and buckles, the lid also having a hook-and-loop fastener connection to the main compartment by which the lid can be hingedly connected to the main compartment when the lid straps and buckles are disengaged.

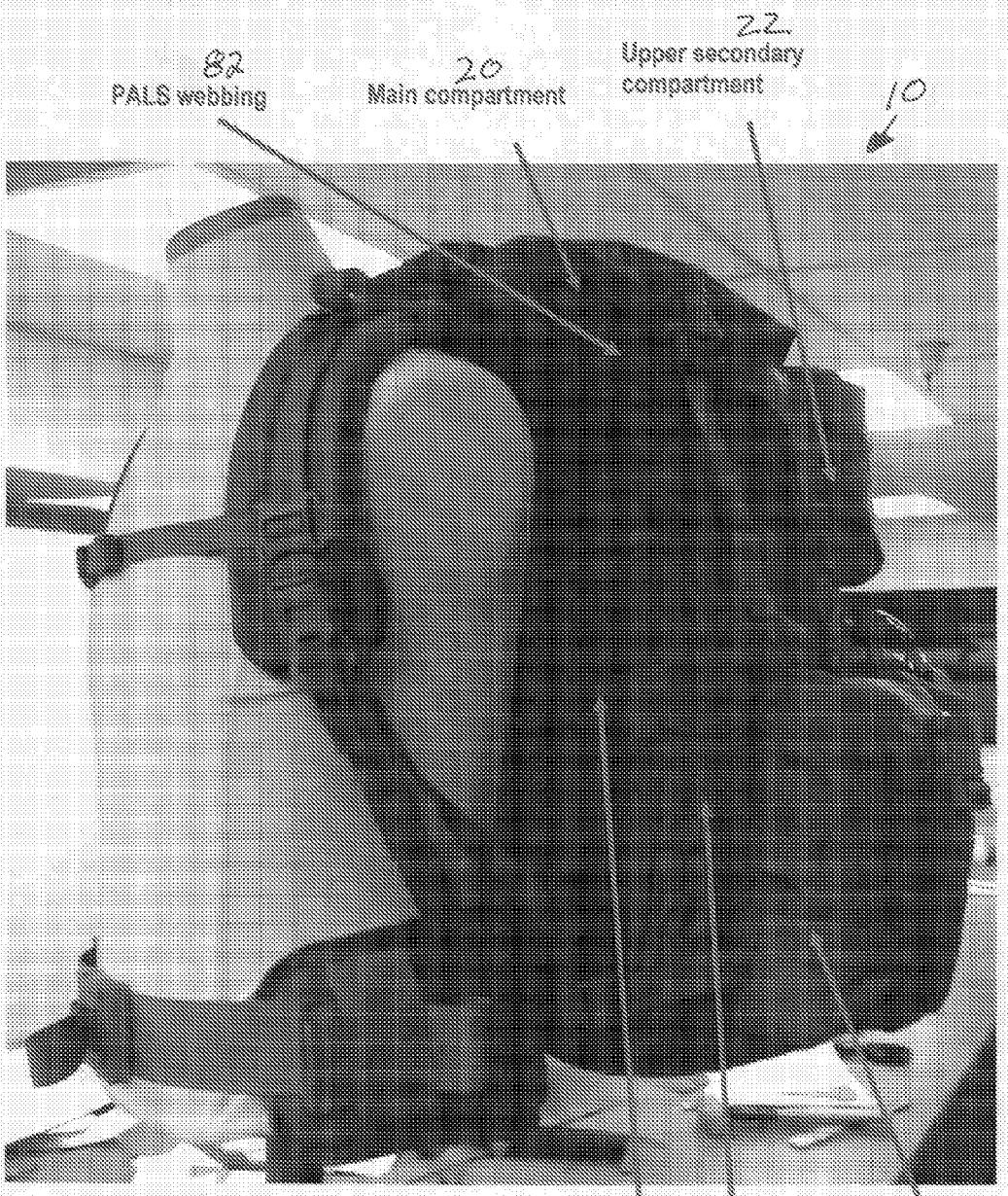
82
PALS webbing
20
Main compartment
22
Upper secondary compartment
10
Side carry handle
116
PALS webbing
82
Detachable side pack
14

FIG. 1

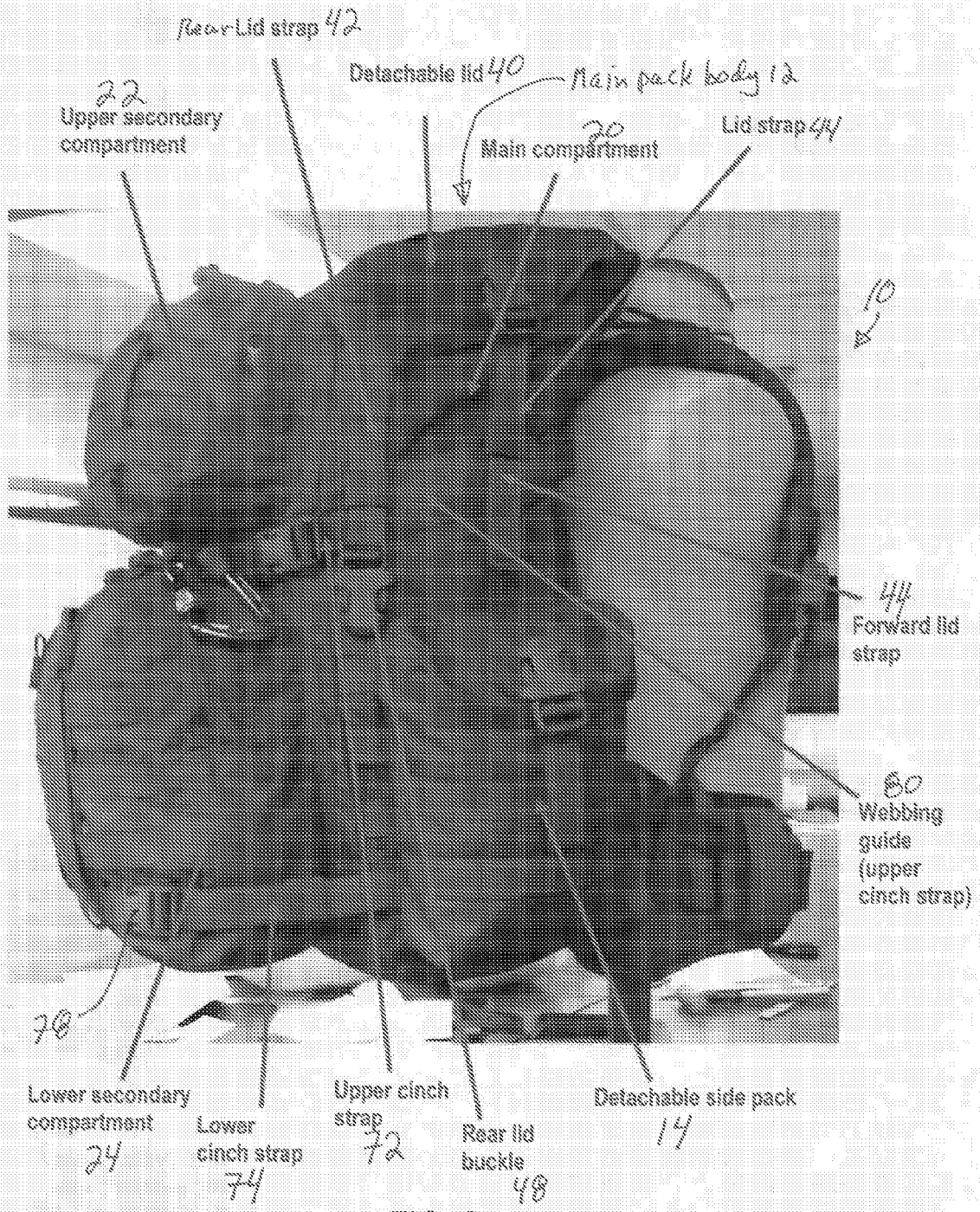
Rear Lid strap 42
Detachable lid 40
Main pack body 12
22
Upper secondary compartment
20
Main compartment
Lid strap 44
10
44
Forward lid strap
80
Webbing guide (upper cinch strap)
30
Lower secondary compartment
24
Lower cinch strap
74
Upper cinch strap
72
Rear lid buckle
48
Detachable side pack
14

FIG. 2

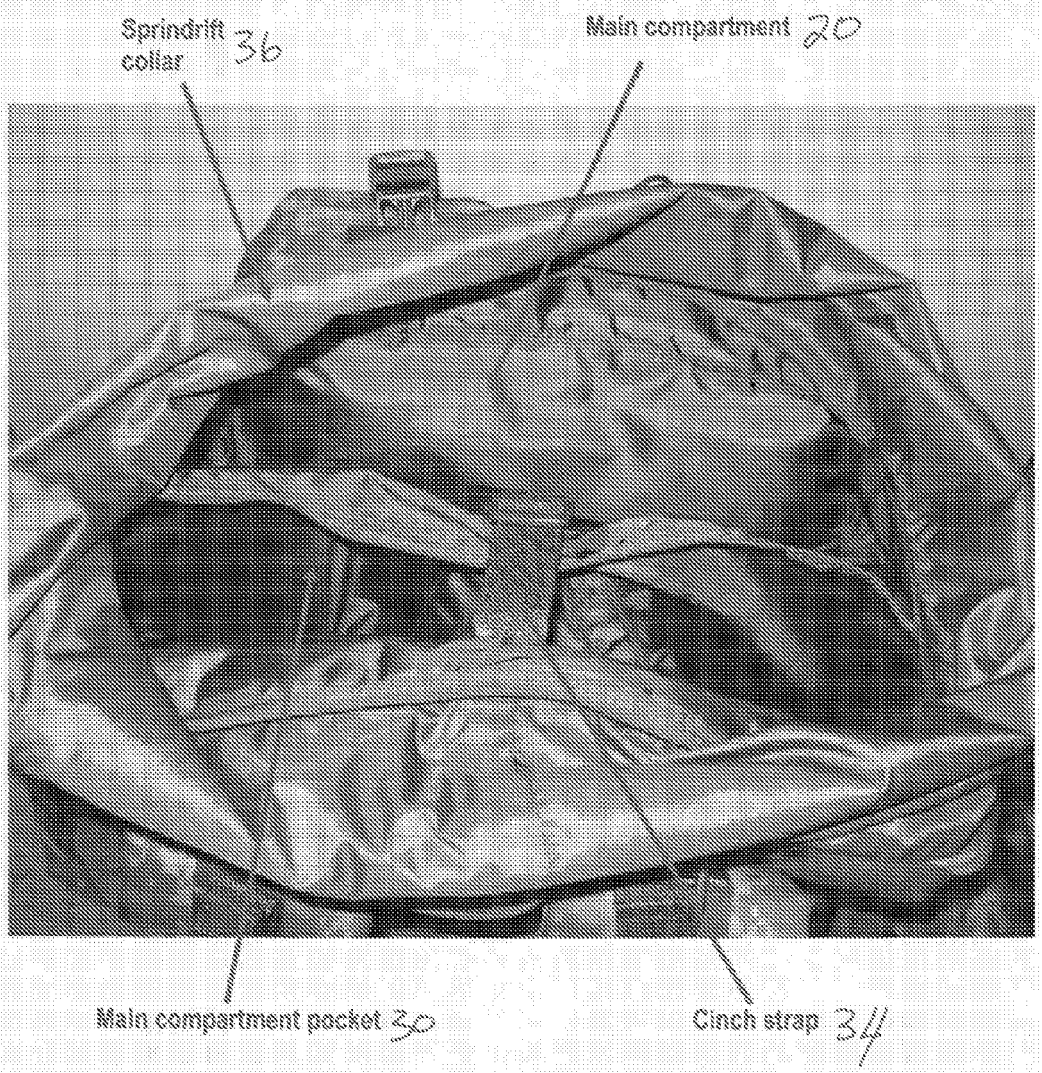
Sprindrift collar 36
Main compartment 20
Main compartment pocket 30
Cinch strap 34

FIG. 3

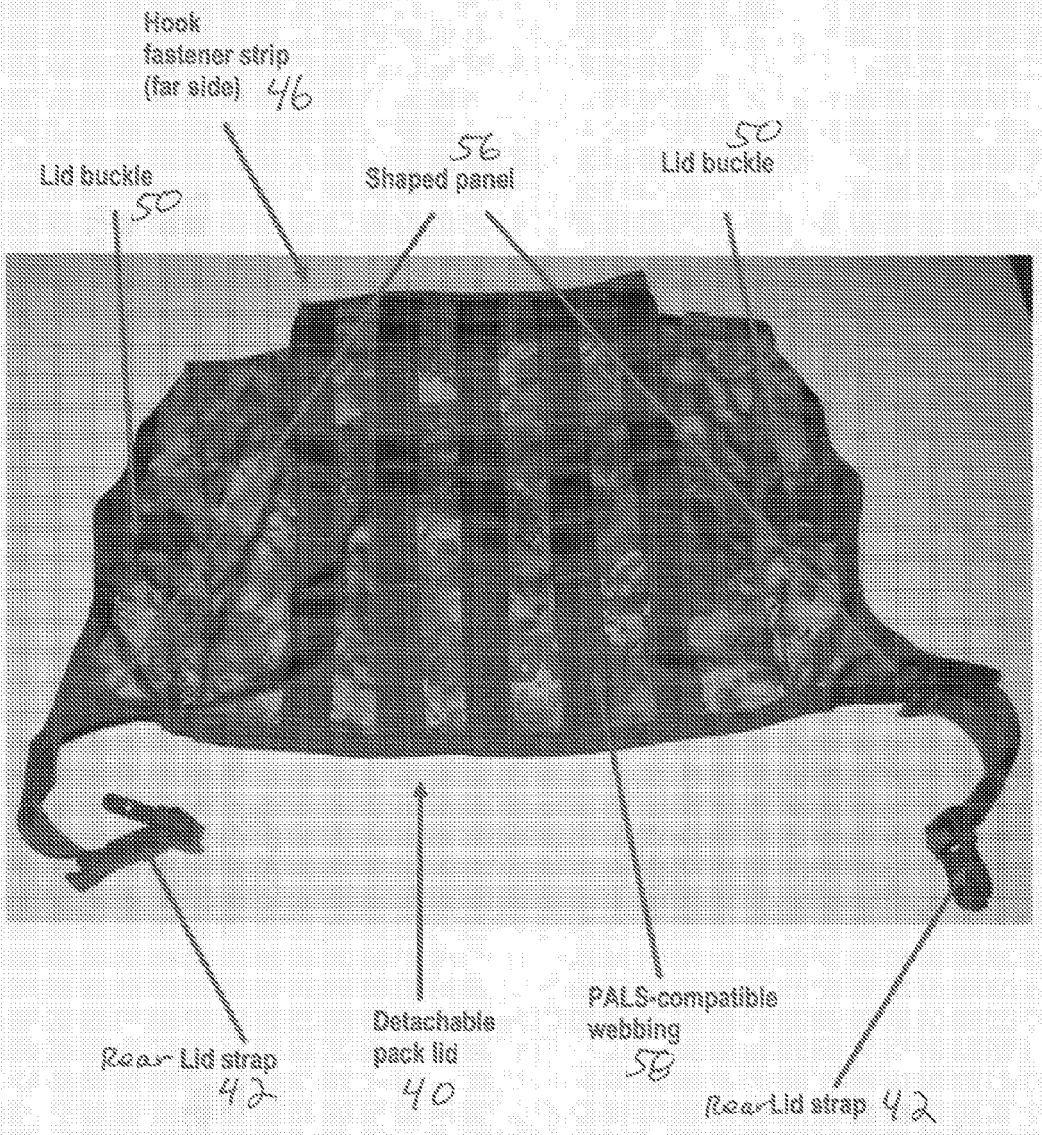
Hook
fastener strip
(far side) 46
Lid buckle
50
56
Shaped panel
50
Lid buckle
Rear Lid strap
42
Detachable
pack lid
40
PALS-compatible
webbing
58
Rear Lid strap 42

FIG. 4

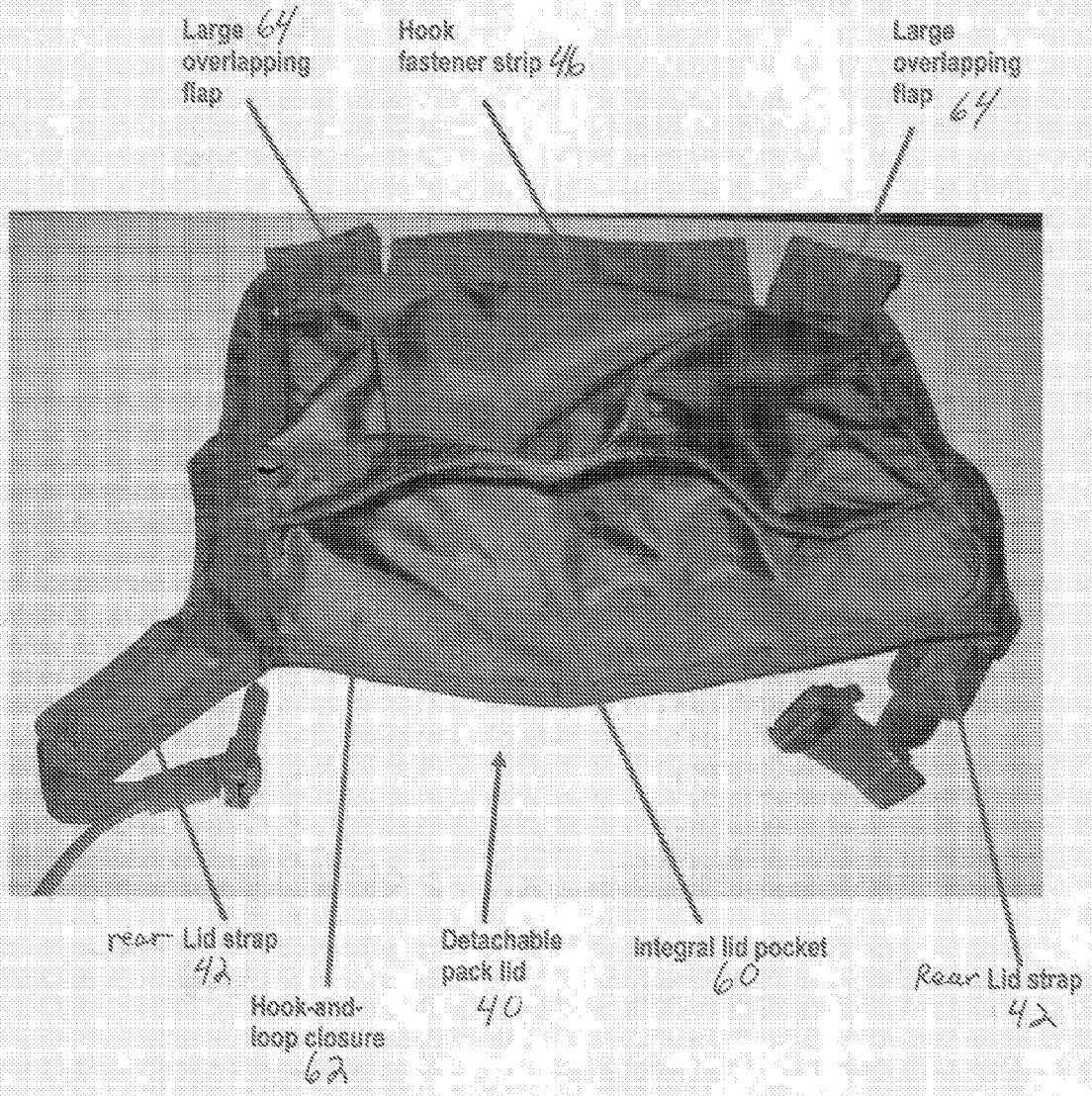
Large 64 overlapping flap
Hook fastener strip 46
Large overlapping flap 64
rear Lid strap 42
Hook-and-loop closure 62
Detachable pack lid 40
Integral lid pocket 60
Rear Lid strap 42

FIG. 5

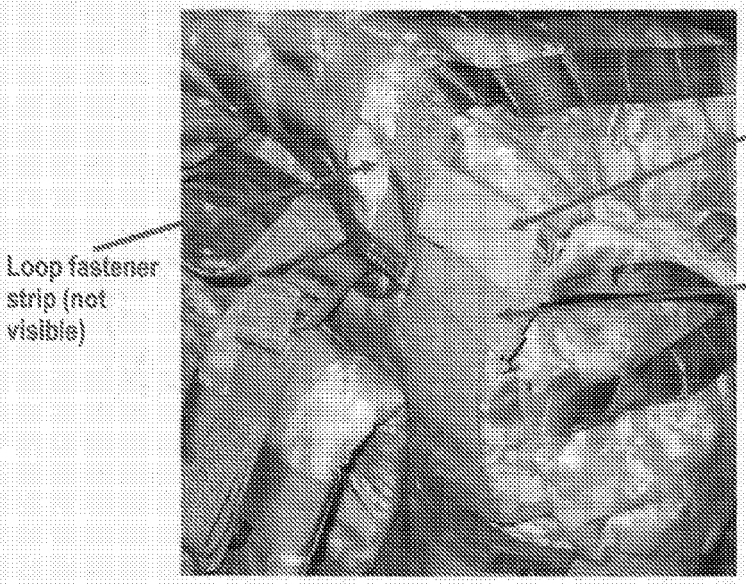
Small 65 overlapping flap
Large 64 overlapping flap
Loop fastener strip (not visible)

FIG. 6


Top carry handle 106
Large overlapping flap (tucked underneath lid) 64
Gap/opening 66
Small overlapping flap 65

FIG. 7

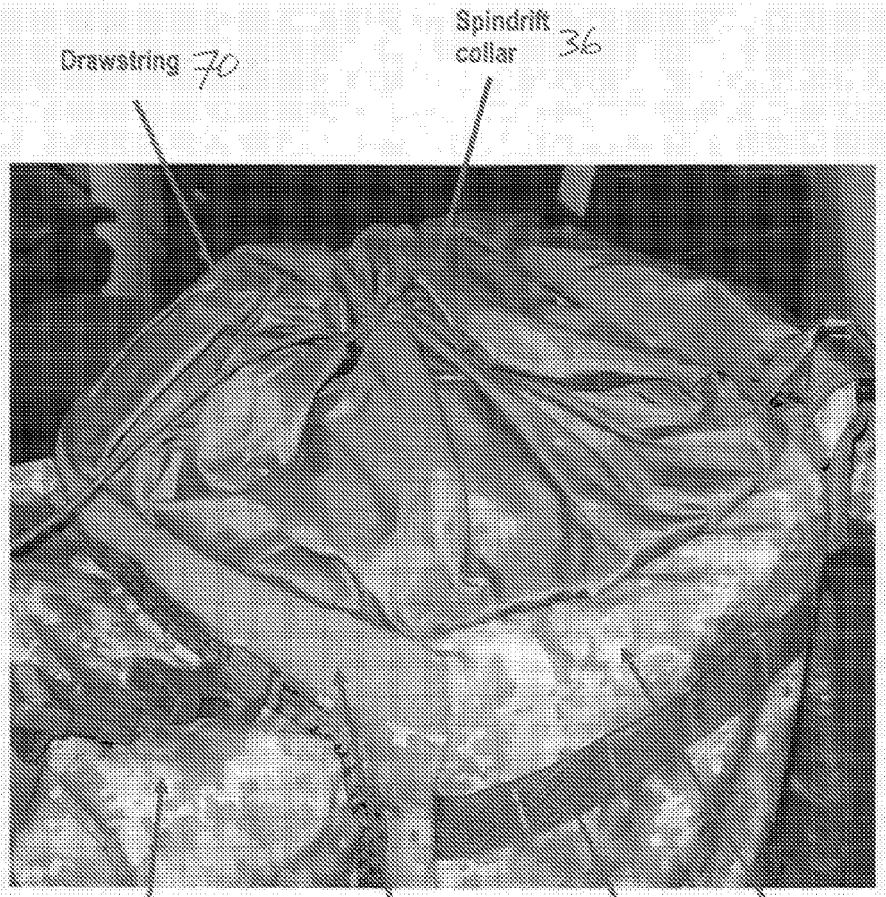
Drawstring 30
Spindrift collar 36
Upper secondary compartment 22
Loop strip (rear panel)
PALS webbing
Main compartment side panel 20

FIG. 8

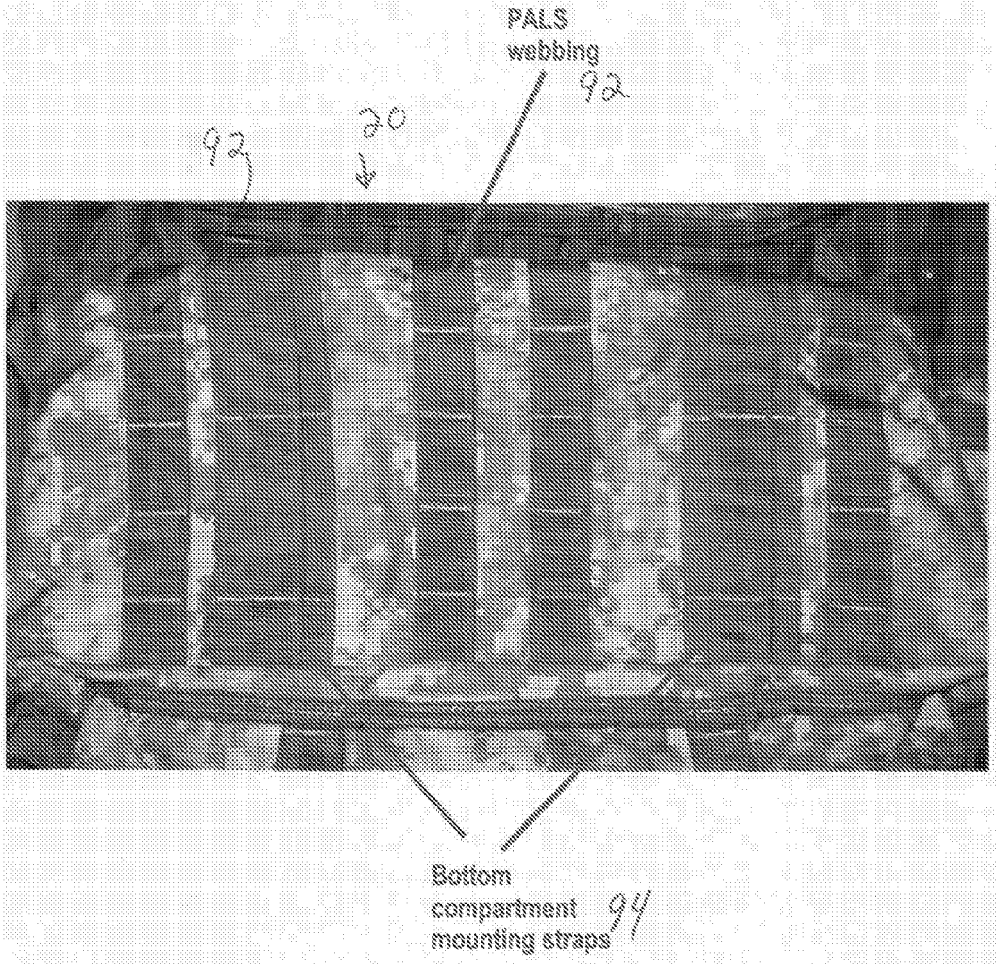
PALS
webbing
92
92
20
Bottom
compartment
mounting straps
94

FIG. 9

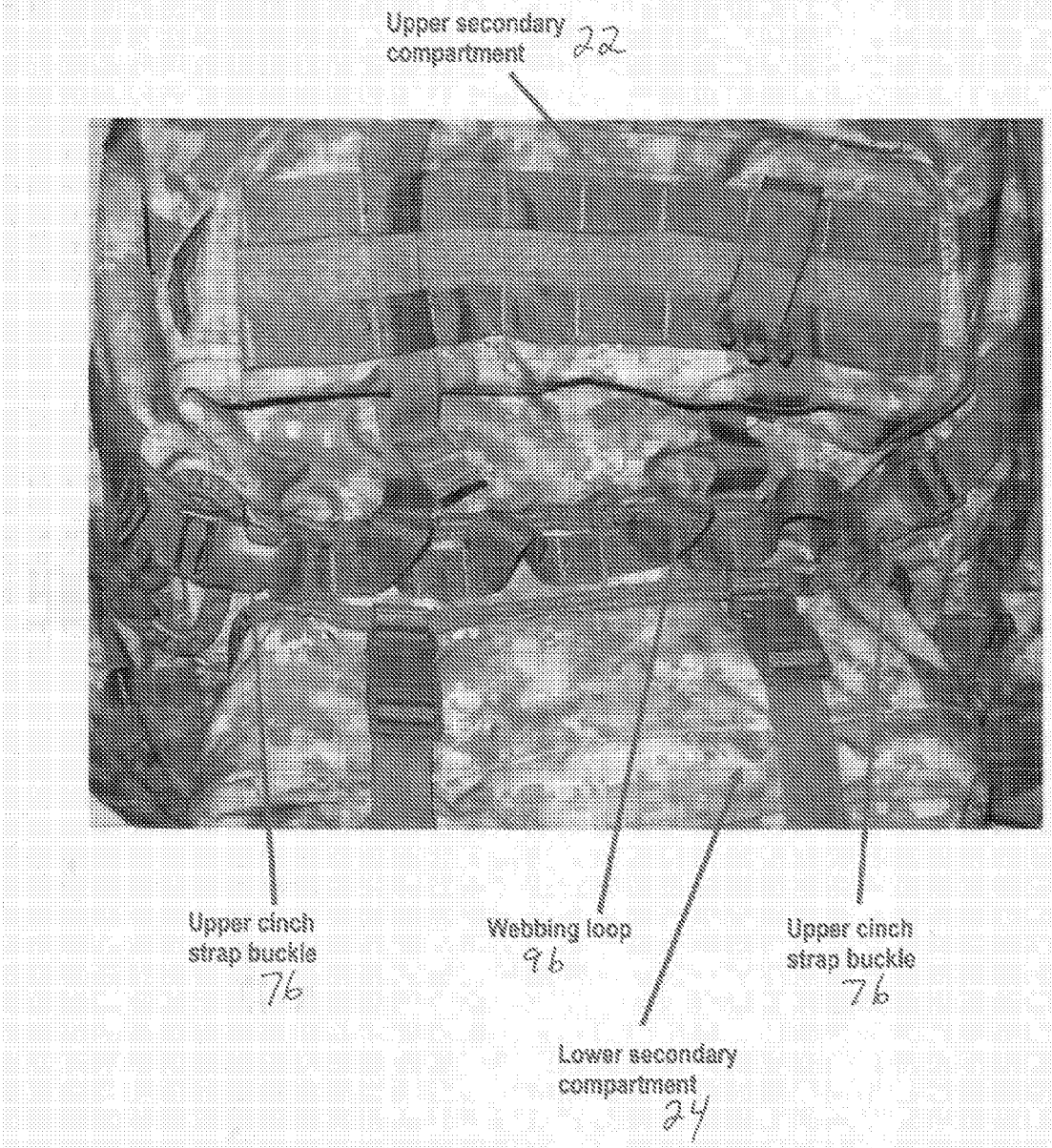
Upper secondary compartment 22
Upper cinch strap buckle 76
Webbing loop 96
Lower secondary compartment 24
Upper cinch strap buckle 76

FIG. 10

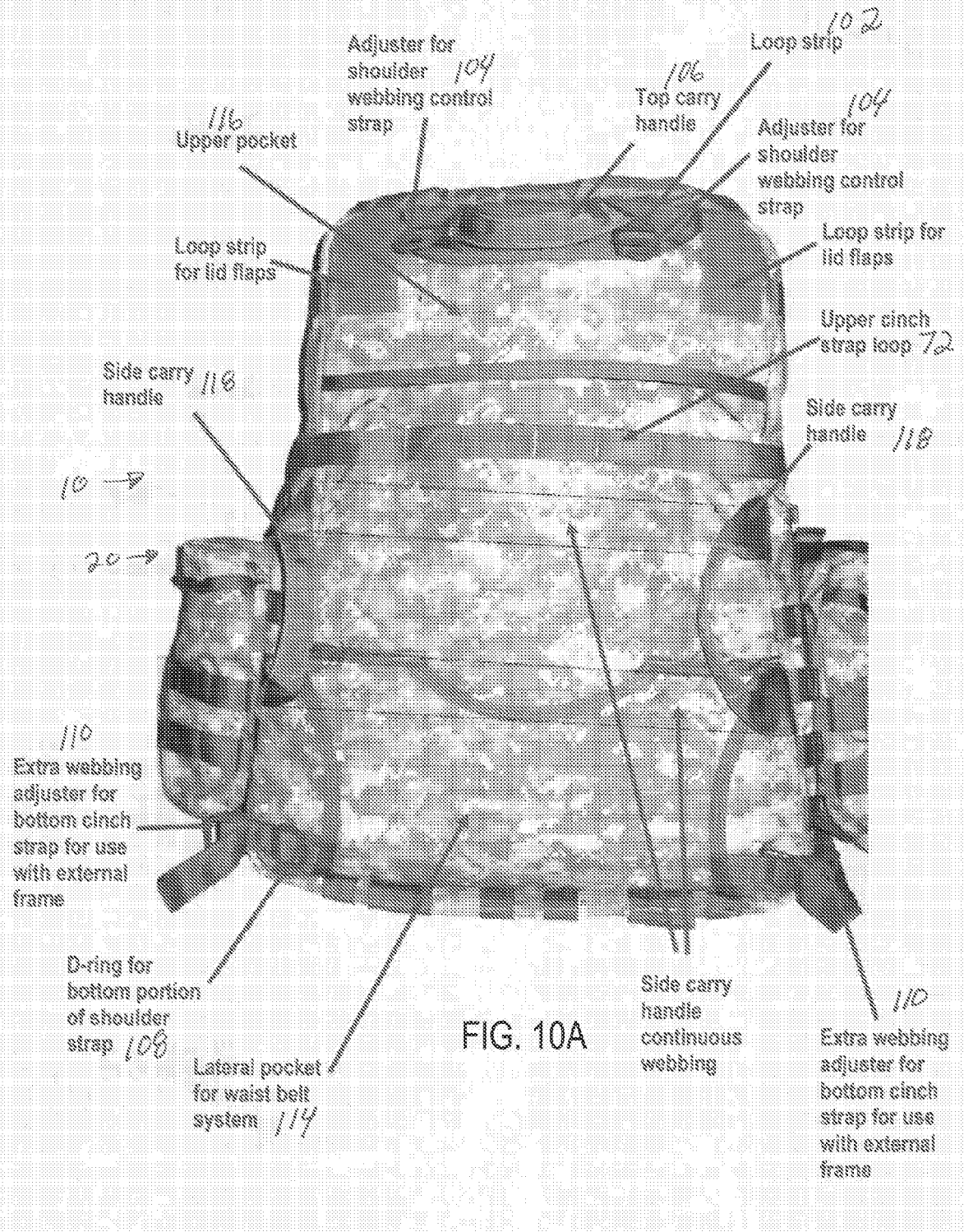
Adjuster for shoulder webbing control strap 104
Loop strip 102
Top carry handle 106
Adjuster for shoulder webbing control strap 104
Upper pocket 116
Loop strip for lid flaps
Loop strip for lid flaps
Upper cinch strap loop 72
Side carry handle 118
Side carry handle 118
10
20
110
Extra webbing adjuster for bottom cinch strap for use with external frame
D-ring for bottom portion of shoulder strap 108
Lateral pocket for waist belt system 114
Side carry handle continuous webbing
110
Extra webbing adjuster for bottom cinch strap for use with external frame

FIG. 10A

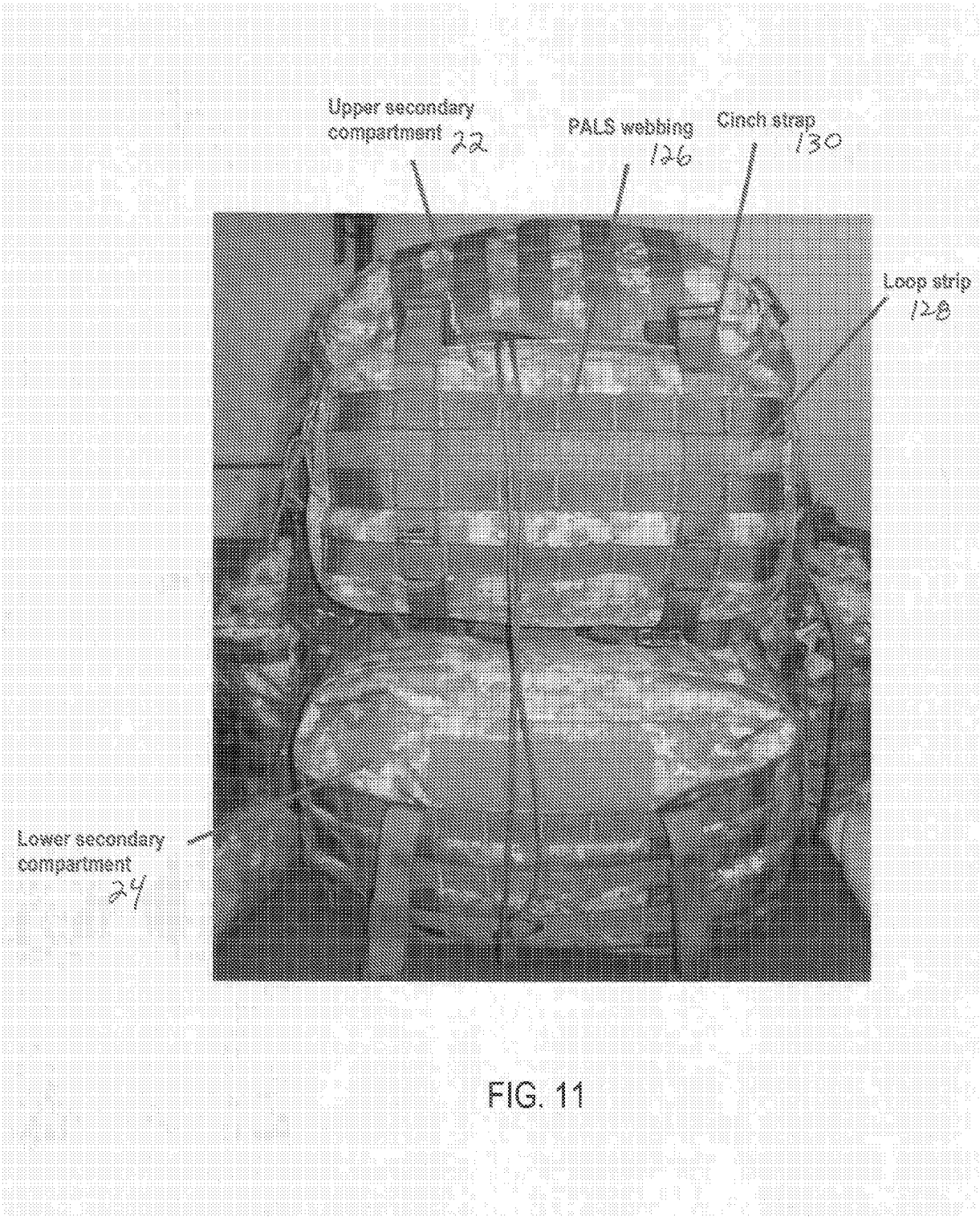
Upper secondary compartment 22
PALS webbing 126
Cinch strap 130
Loop strip 128
Lower secondary compartment 24

FIG. 11

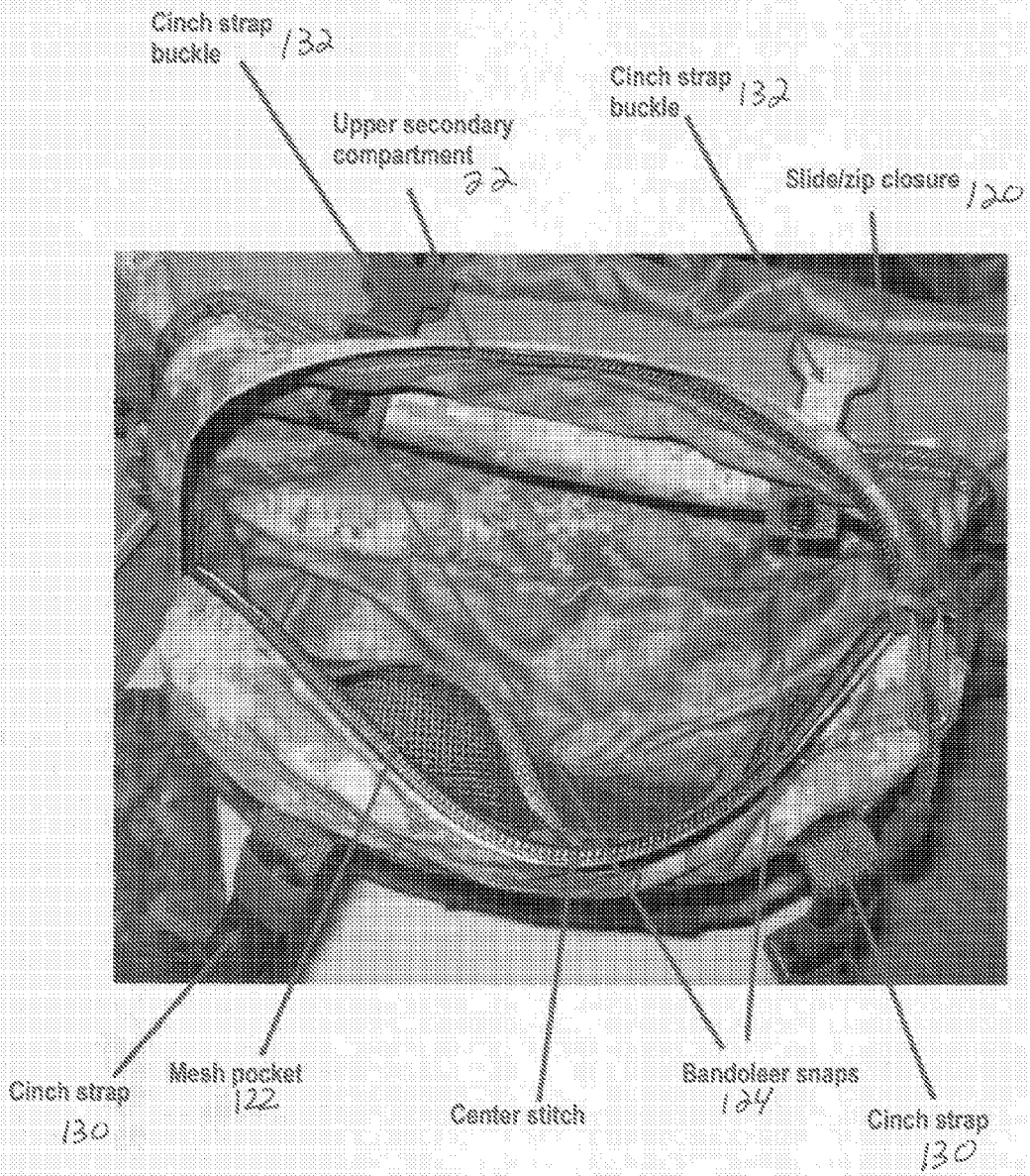
Cinch strap buckle 132
Upper secondary compartment 92
Cinch strap buckle 132
Slide/zip closure 120
Cinch strap 130
Mesh pocket 122
Center stitch
Bandoleer snaps 134
Cinch strap 130

FIG. 12

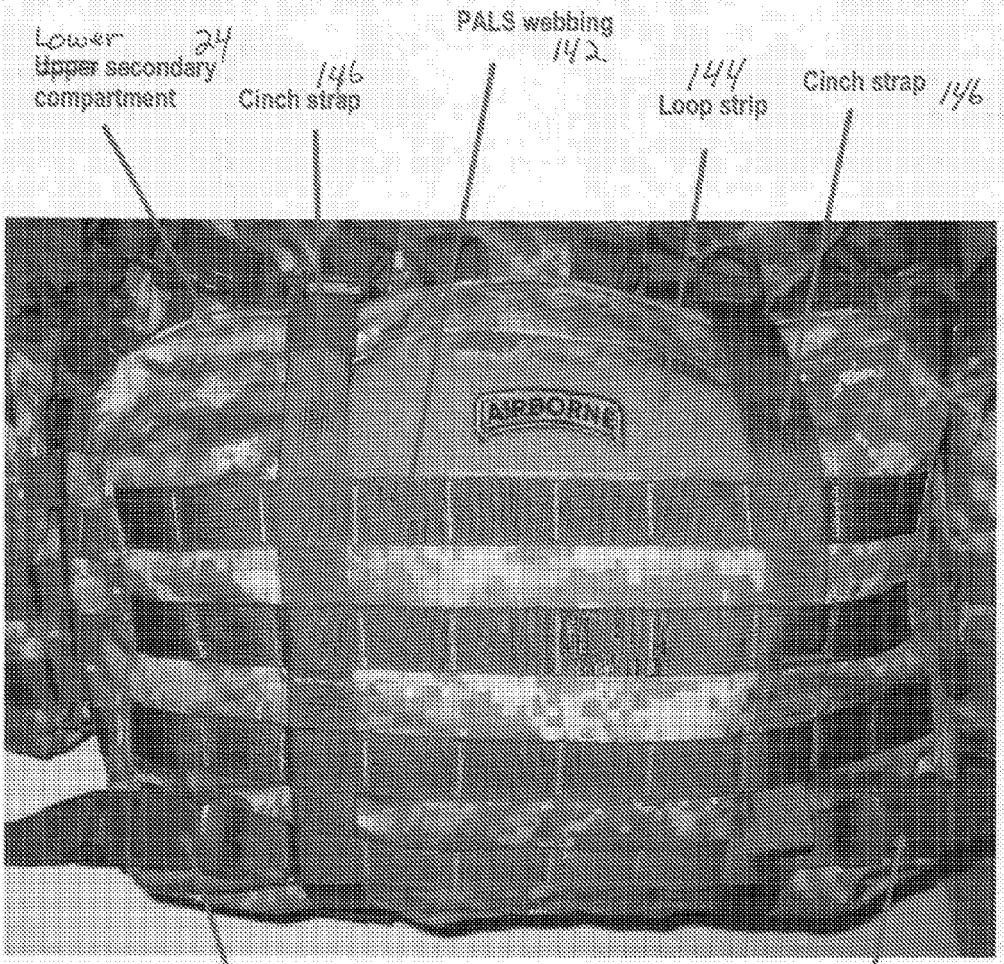
Lower secondary compartment 24
Cinch strap 146
PALS webbing 142
Loop strip 144
Cinch strap 146
AIRBORNE
Lower cinch strap buckle 76
Lower cinch strap buckle 78

FIG. 13

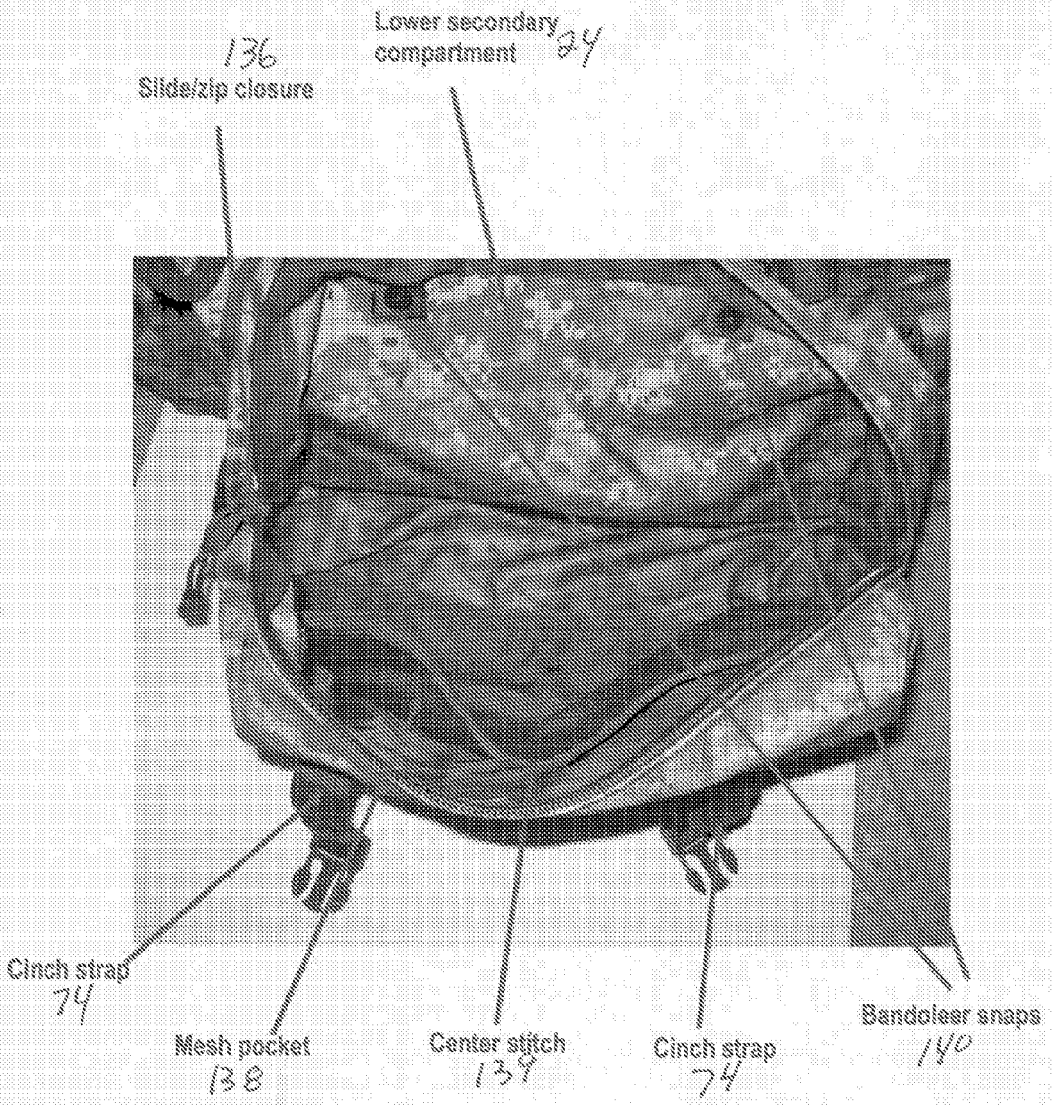
136
Slide/zip closure
Lower secondary compartment 84
Cinch strap 74
Mesh pocket 138
Center stitch 134
Cinch strap 74
Bandoleer snaps 140

FIG. 14

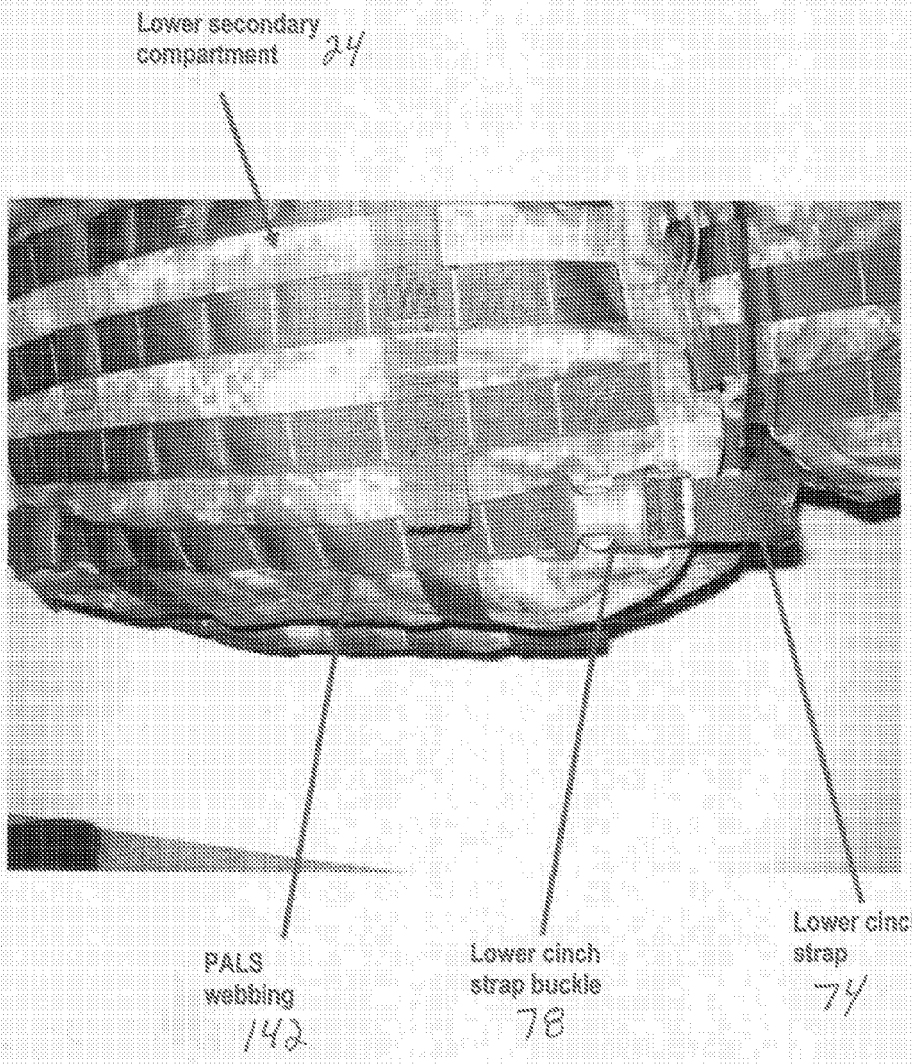
Lower secondary compartment 24
PALS webbing 142
Lower cinch strap buckle 78
Lower cinch strap 74

FIG. 15

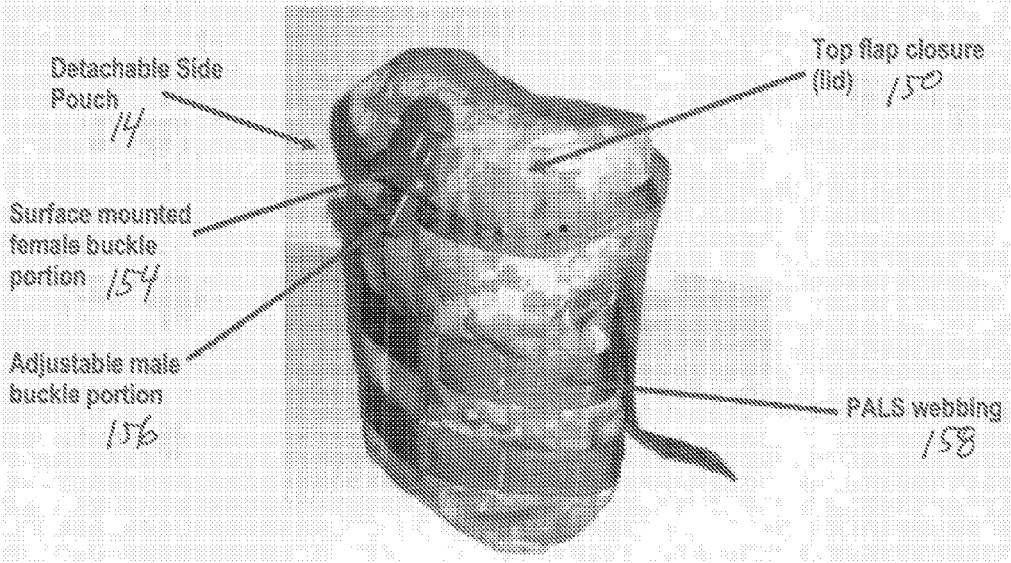
Detachable Side Pouch 14
Top flap closure (lid) 150
Surface mounted female buckle portion 154
Adjustable male buckle portion 156
PALS webbing 158

FIG. 16

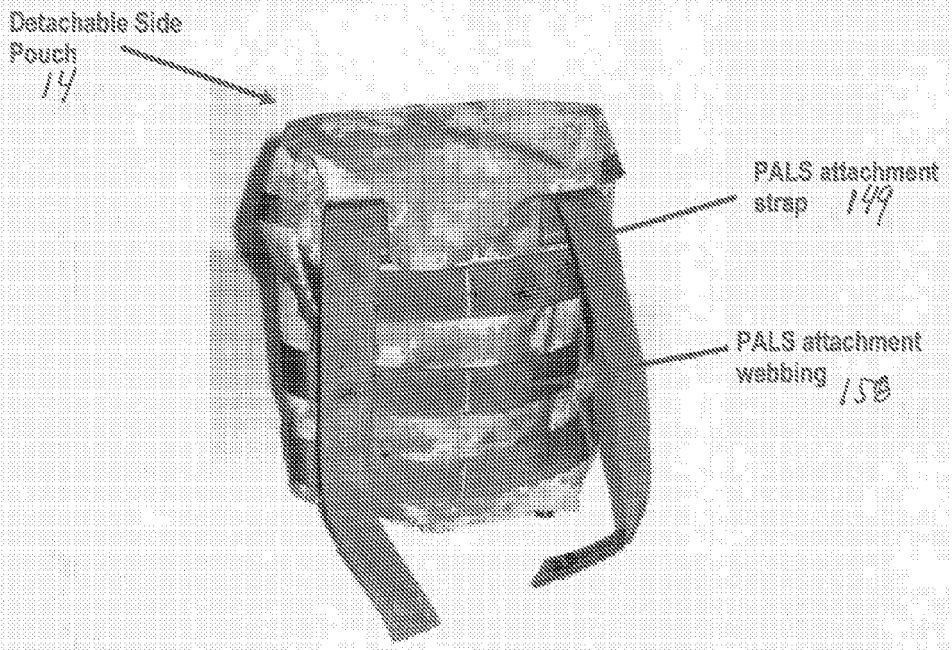
Detachable Side Pouch 14
PALS attachment strap 149
PALS attachment webbing 158

FIG. 17

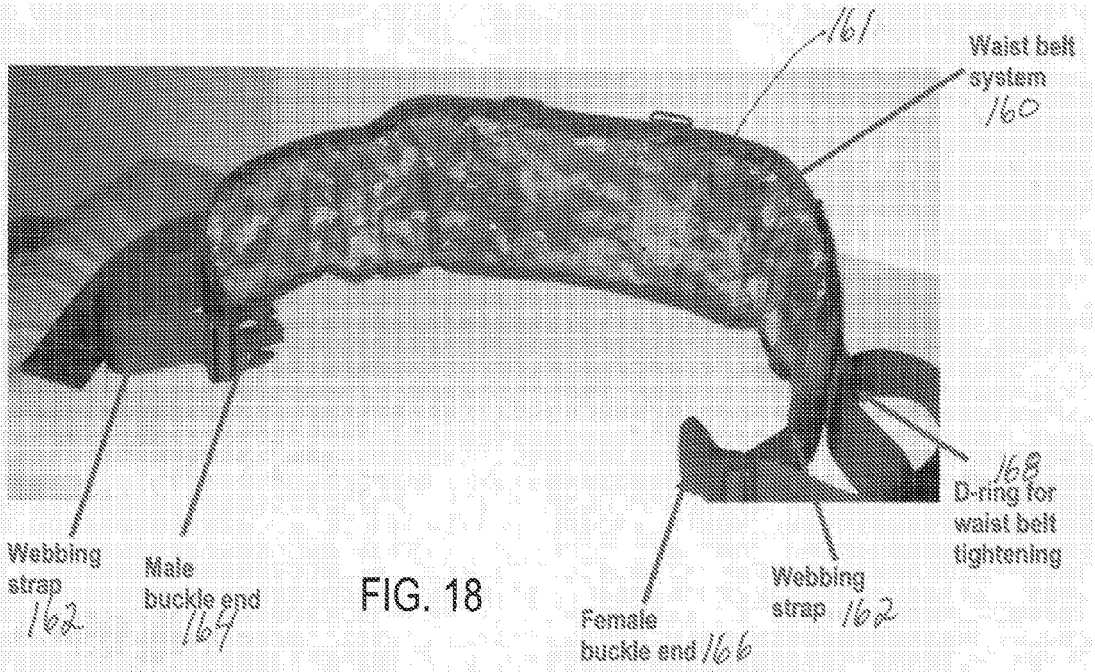
161
Waist belt system 160
168 D-ring for waist belt tightening
Webbing strap 162
Male buckle end 169
Female buckle end 166
Webbing strap 162

FIG. 18

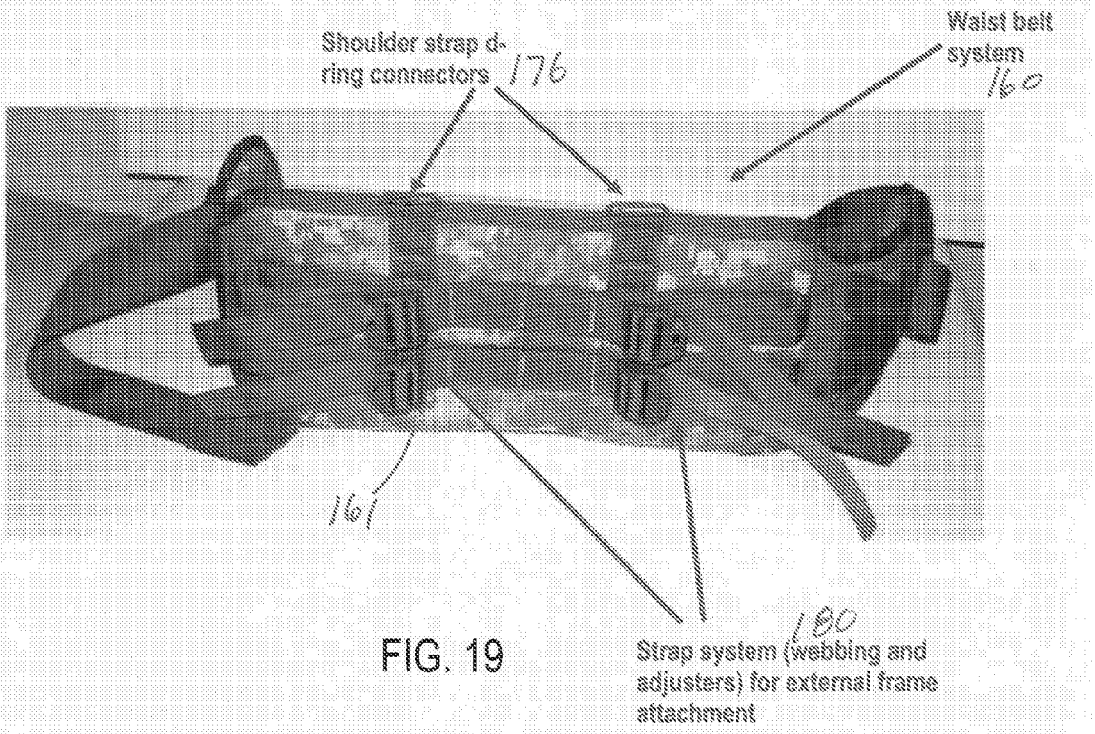
Shoulder strap d-ring connectors 176
Waist belt system 160
161
180 Strap system (webbing and adjusters) for external frame attachment

FIG. 19

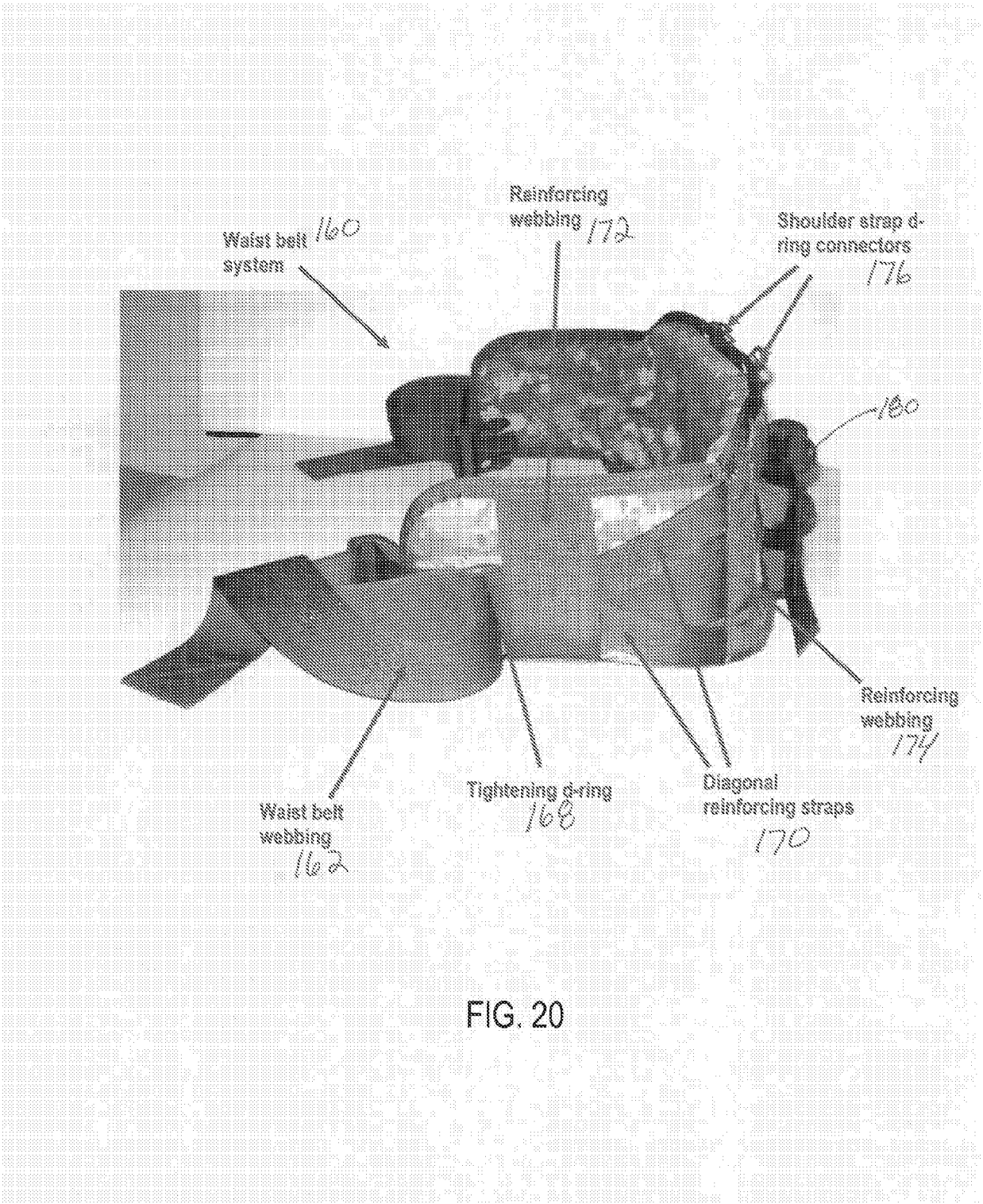
Waist belt system 160
Reinforcing webbing 172
Shoulder strap d-ring connectors 176
180
Reinforcing webbing 174
Waist belt webbing 162
Tightening d-ring 168
Diagonal reinforcing straps 170

FIG. 20

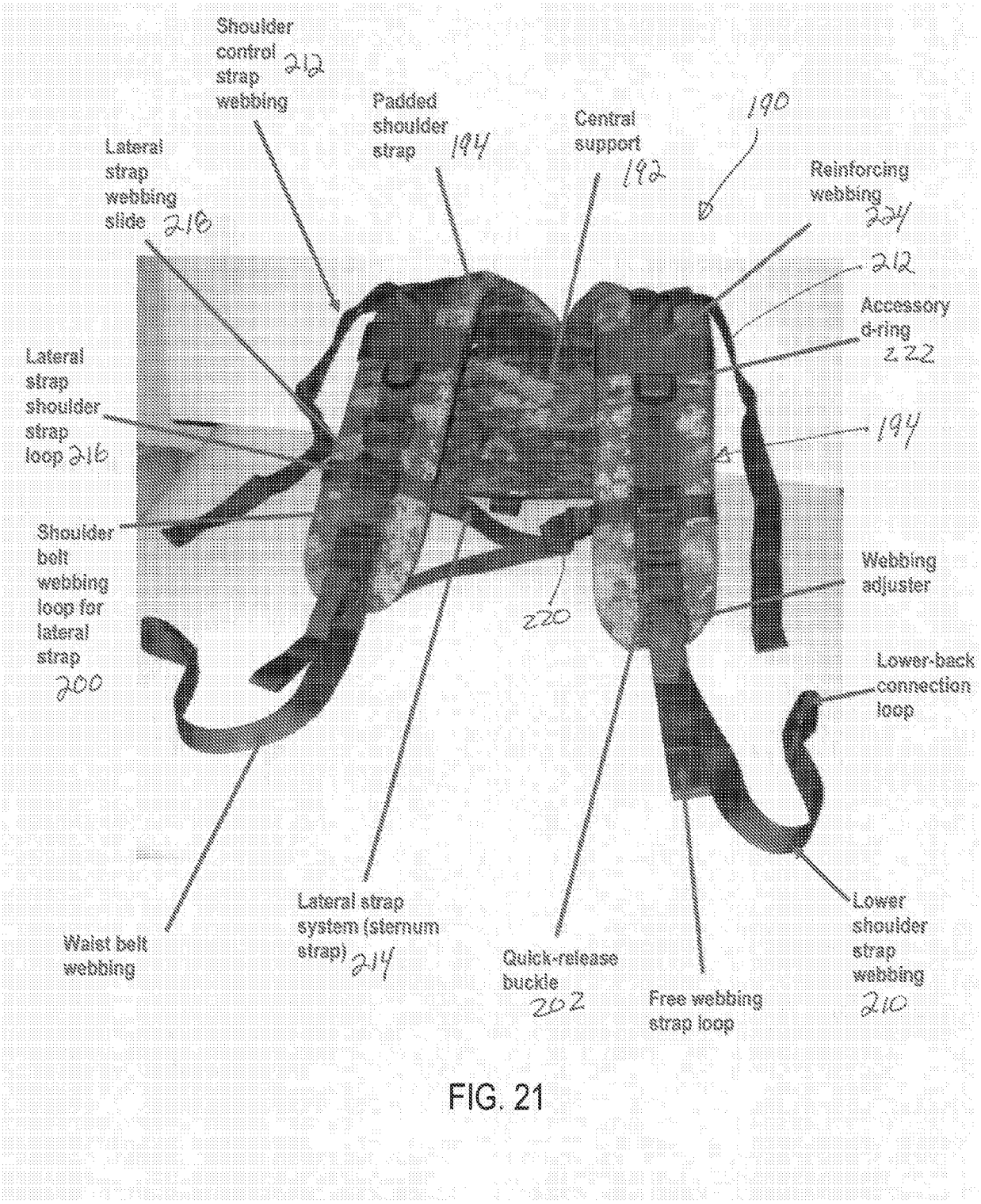
Shoulder control strap webbing 212
Padded shoulder strap 194
Central support 192
190
Lateral strap webbing slide 210
Reinforcing webbing 234
212
Accessory d-ring 222
Lateral strap shoulder strap loop 216
194
Shoulder belt webbing loop for lateral strap 200
220
Webbing adjuster
Lower-back connection loop
Waist belt webbing
Lateral strap system (sternum strap) 214
Quick-release buckle 202
Free webbing strap loop
Lower shoulder strap webbing 210

FIG. 21

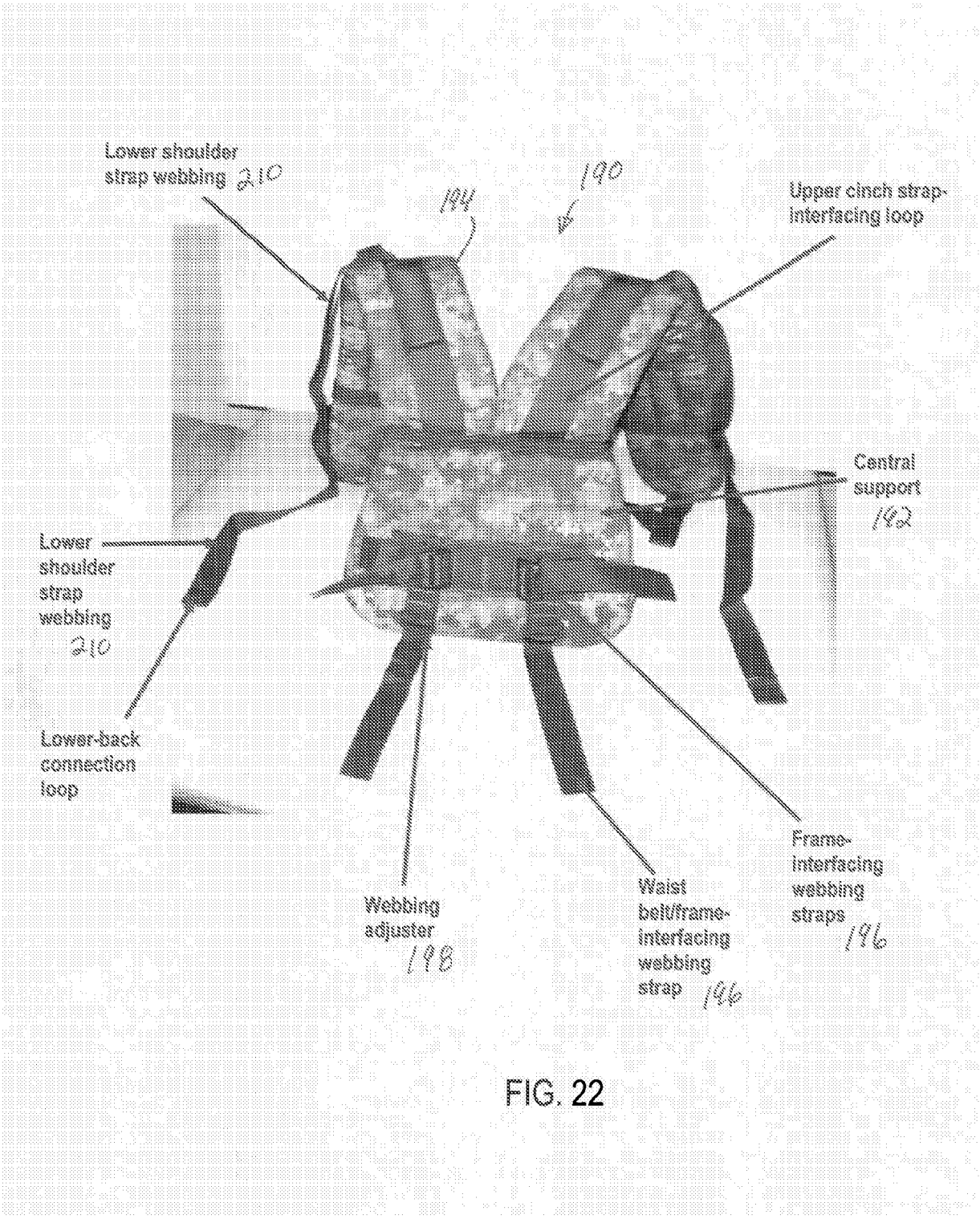
Lower shoulder strap webbing 210
194
190
Upper cinch strap-interfacing loop
Central support 192
Lower shoulder strap webbing 210
Lower-back connection loop
Webbing adjuster 198
Waist belt/frame-interfacing webbing strap 196
Frame-interfacing webbing straps 196

FIG. 22

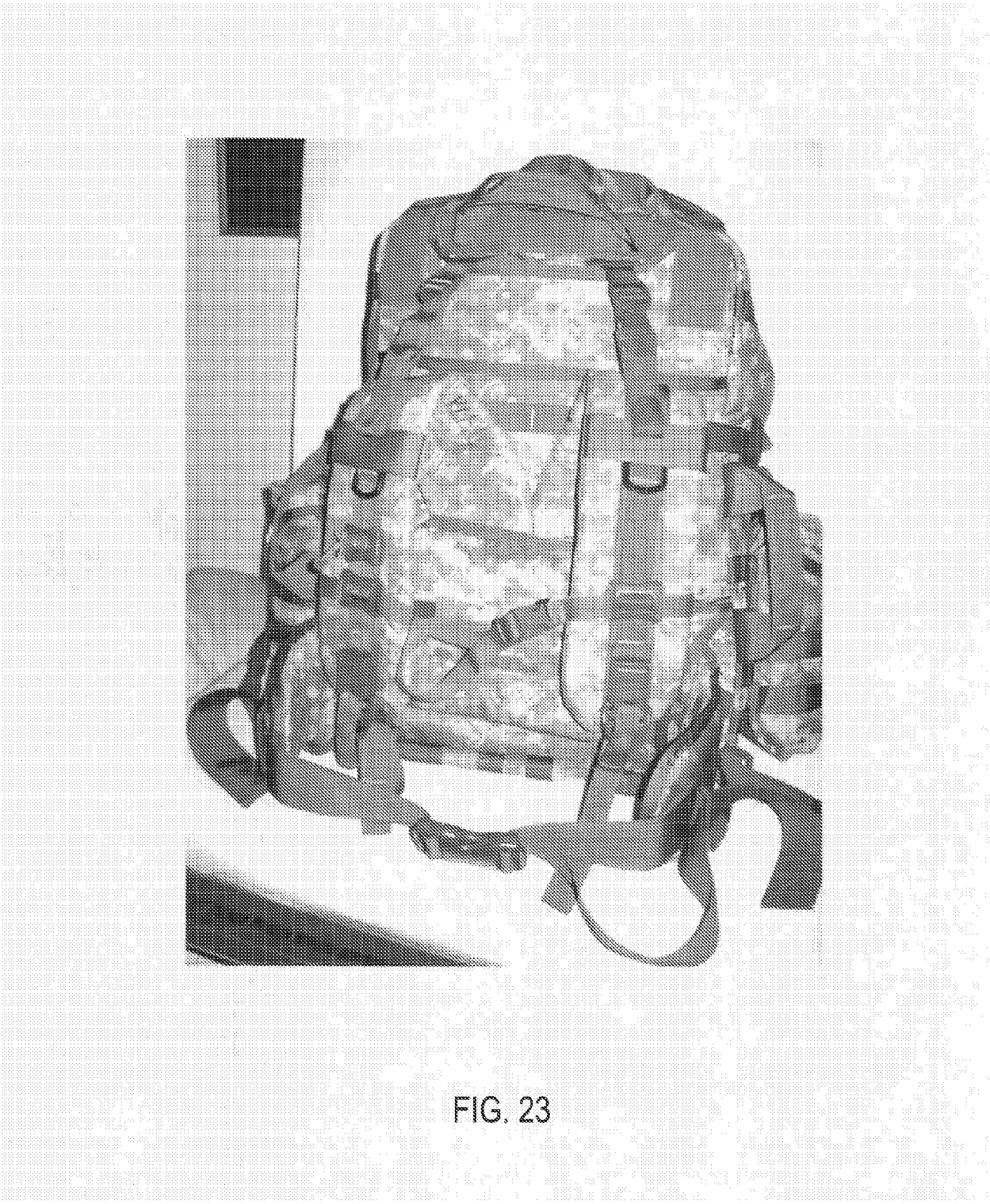

FIG. 23

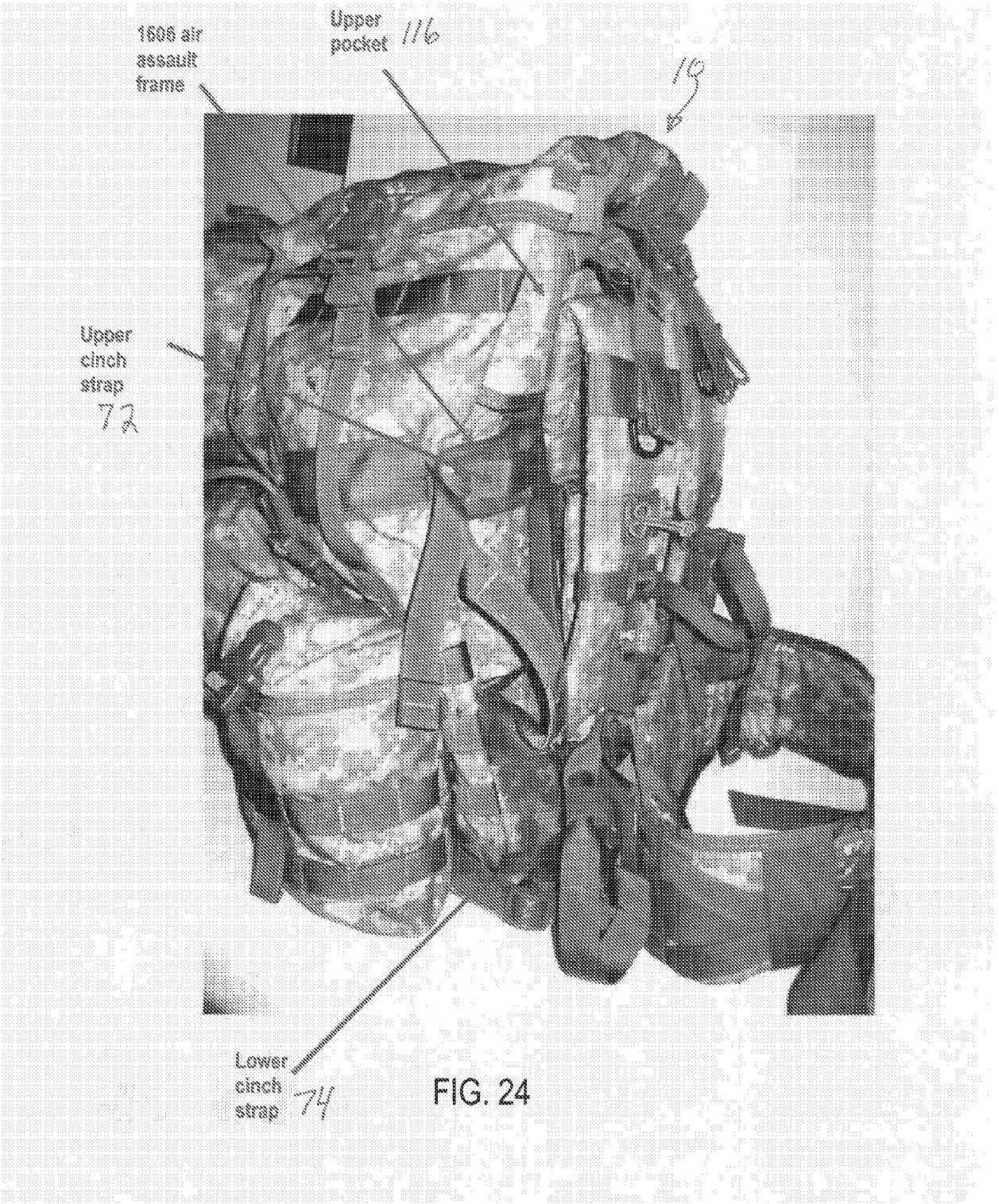
1606 air assault frame
Upper pocket 116
19
Upper cinch strap 72
Lower cinch strap 74

FIG. 24

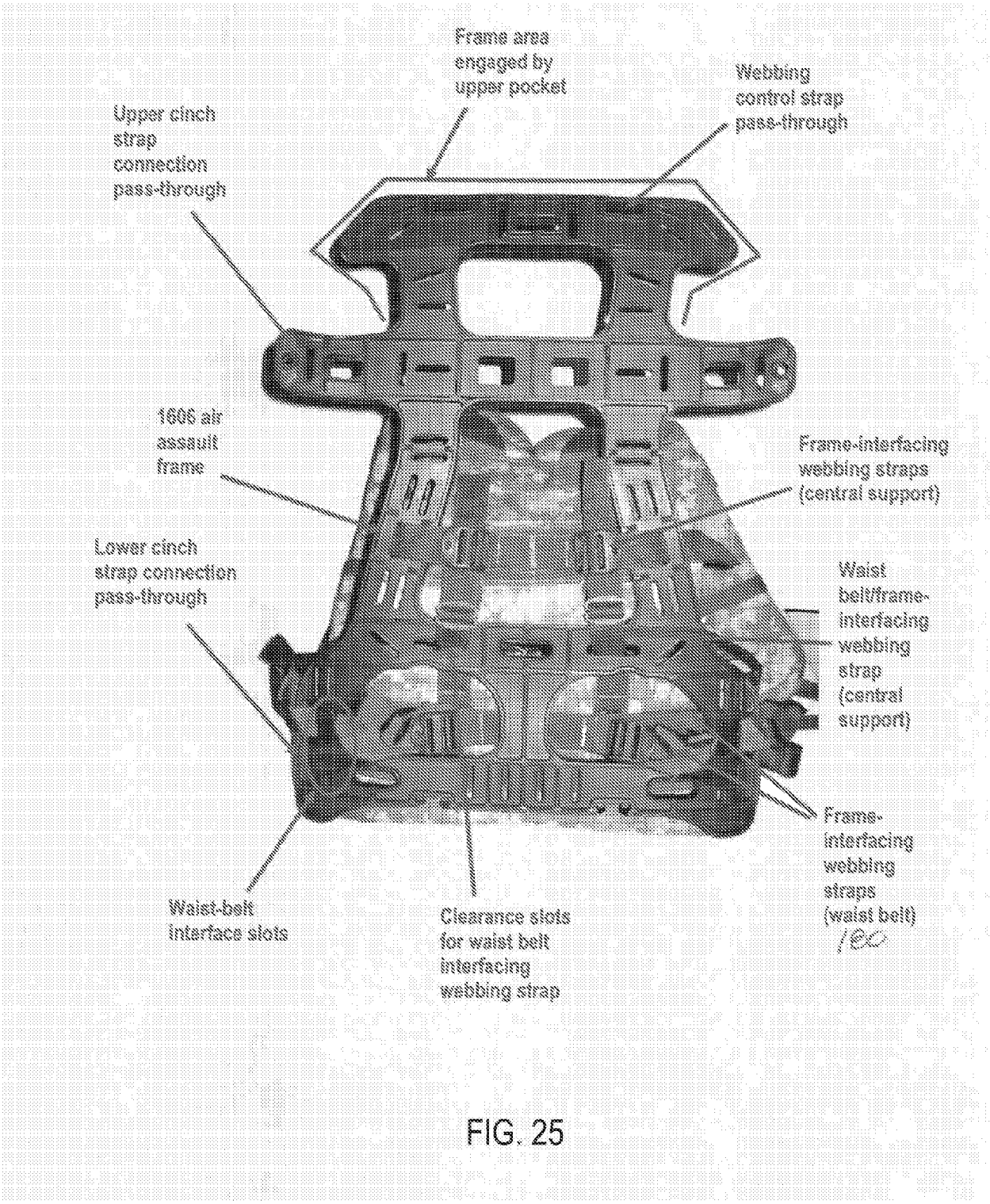
Frame area engaged by upper pocket
Webbing control strap pass-through
Upper cinch strap connection pass-through
1606 air assault frame
Frame-interfacing webbing straps (central support)
Lower cinch strap connection pass-through
Waist belt/frame-interfacing webbing strap (central support)
Frame-interfacing webbing straps (waist belt)
Waist-belt interface slots
Clearance slots for waist belt interfacing webbing strap

FIG. 25

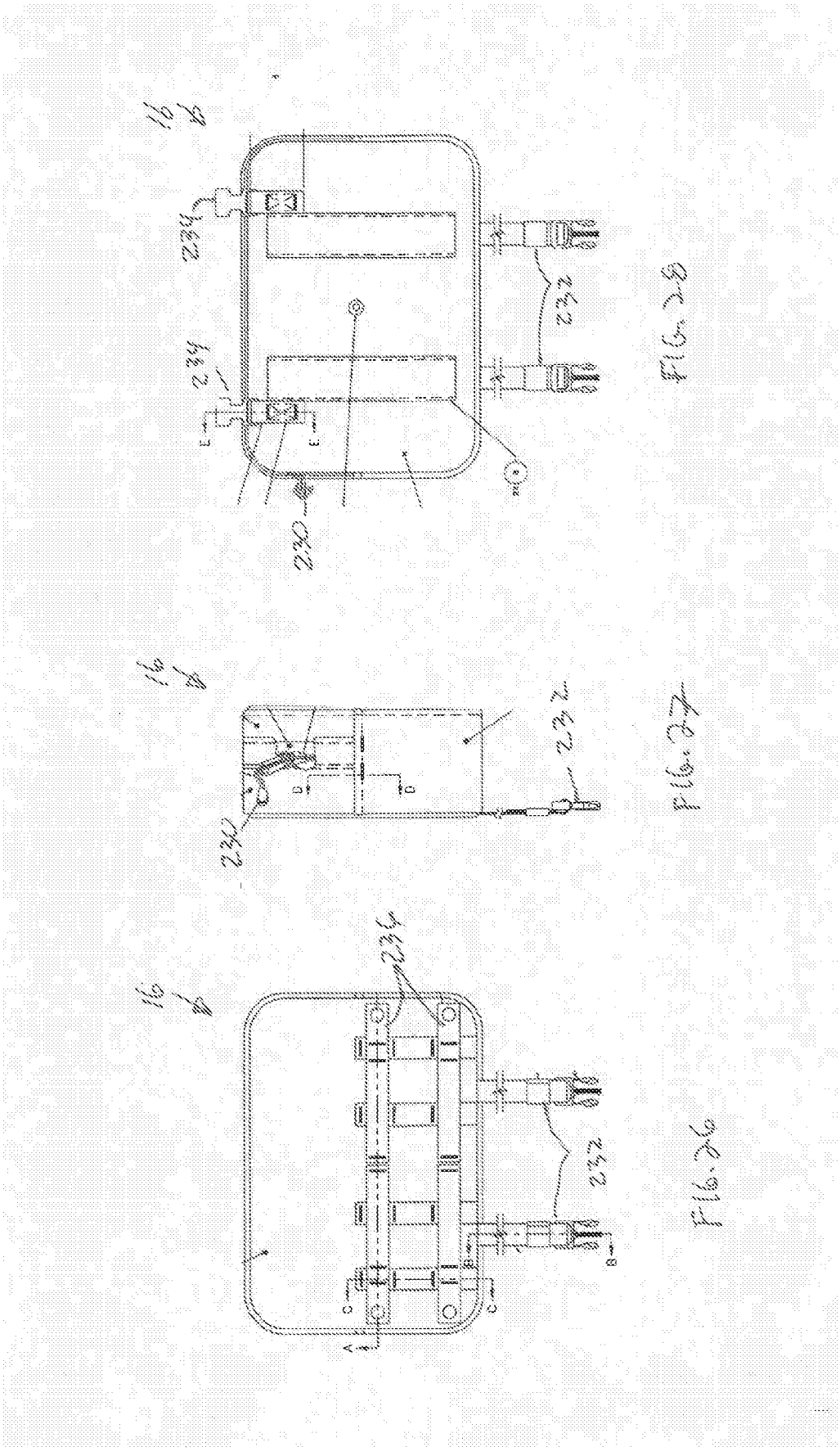

FIG. 36

FIG. 37

FIG. 38

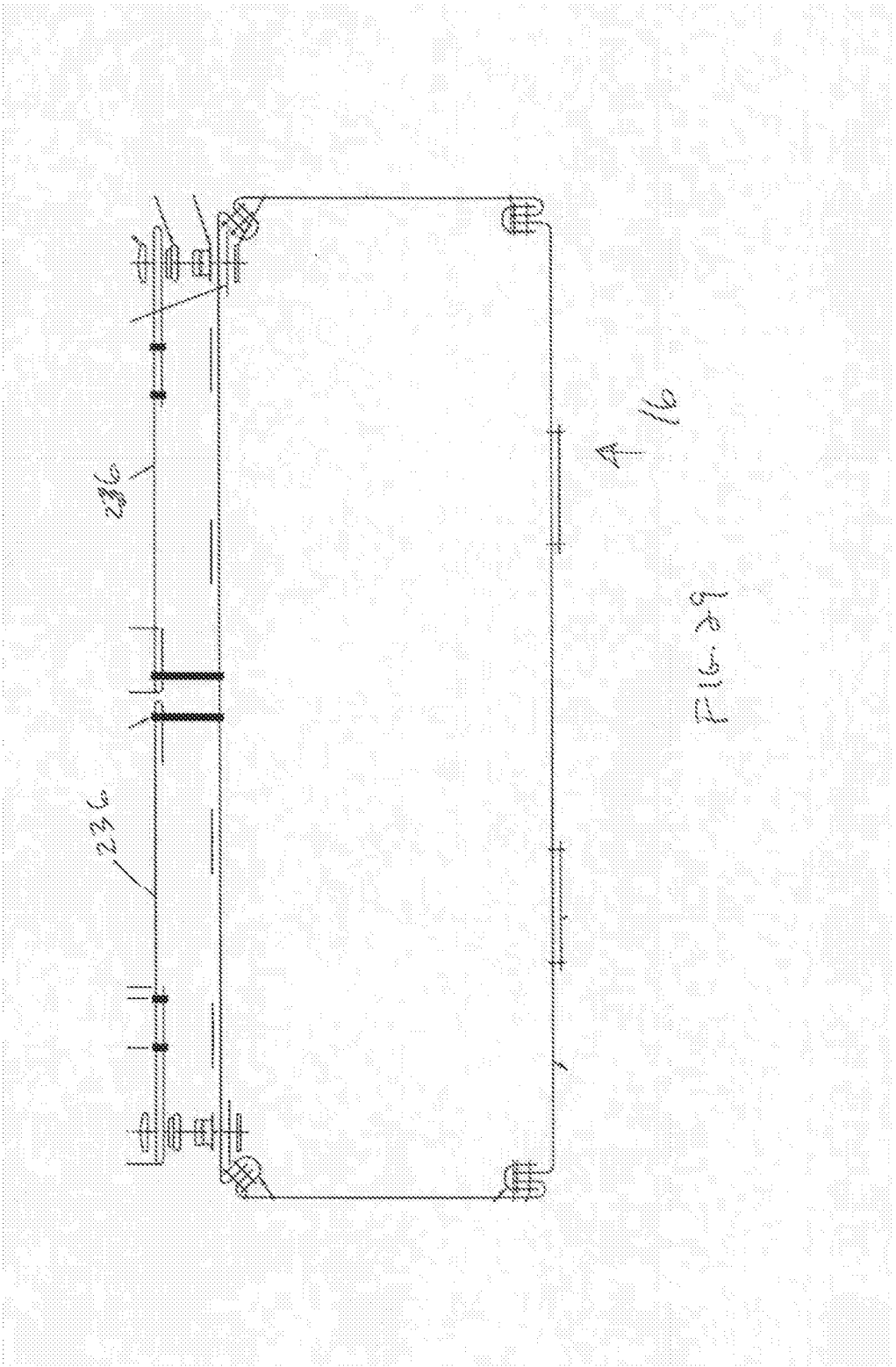

FIG. 24