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Kao

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(54) **BACKPACK WITH SUSPENSION ARRANGEMENT**

(71) Applicant: **Peter Kao**, Union City, CA (US)

(72) Inventor: **Peter Kao**, Union City, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

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A45F 3/04 (2006.01)

(52) **U.S. Cl.**
CPC ***A45F 3/047*** (2013.01)

(58) **Field of Classification Search**
CPC A45F 3/047; A45F 3/04; A45F 3/12; A45F 3/14; A45C 13/30
See application file for complete search history.

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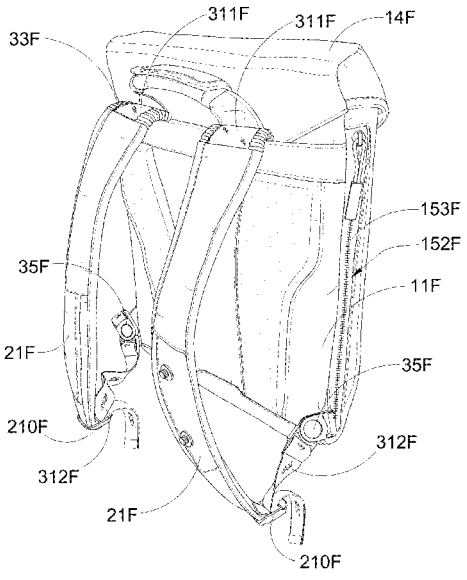
Primary Examiner — Corey Skurdal

(74) *Attorney, Agent, or Firm* — Raymond Y. Chan; David and Raymond Patent Firm

(57) **ABSTRACT**

A backpack includes a pack body, two shoulder straps extended from the pack body for allowing the wearer to wear the pack body at the wearer's back, and a suspension arrangement which includes a resilient unit provided between the pack body and the shoulder straps for absorbing a bounding force of the pack body. Therefore, the resilient unit allows a relative movement of the pack body with respect to each of the shoulder straps but minimizes the relative movement of the pack body by absorbing the bounding force of the pack body. The resilient unit is also arranged for evenly distributing a loading force of the pack body to each of the shoulder straps, such that the resilient unit absorbs the bounding force of the pack body at different directions so as to balance the uneven loading force at the pack body.

20 Claims, 22 Drawing Sheets



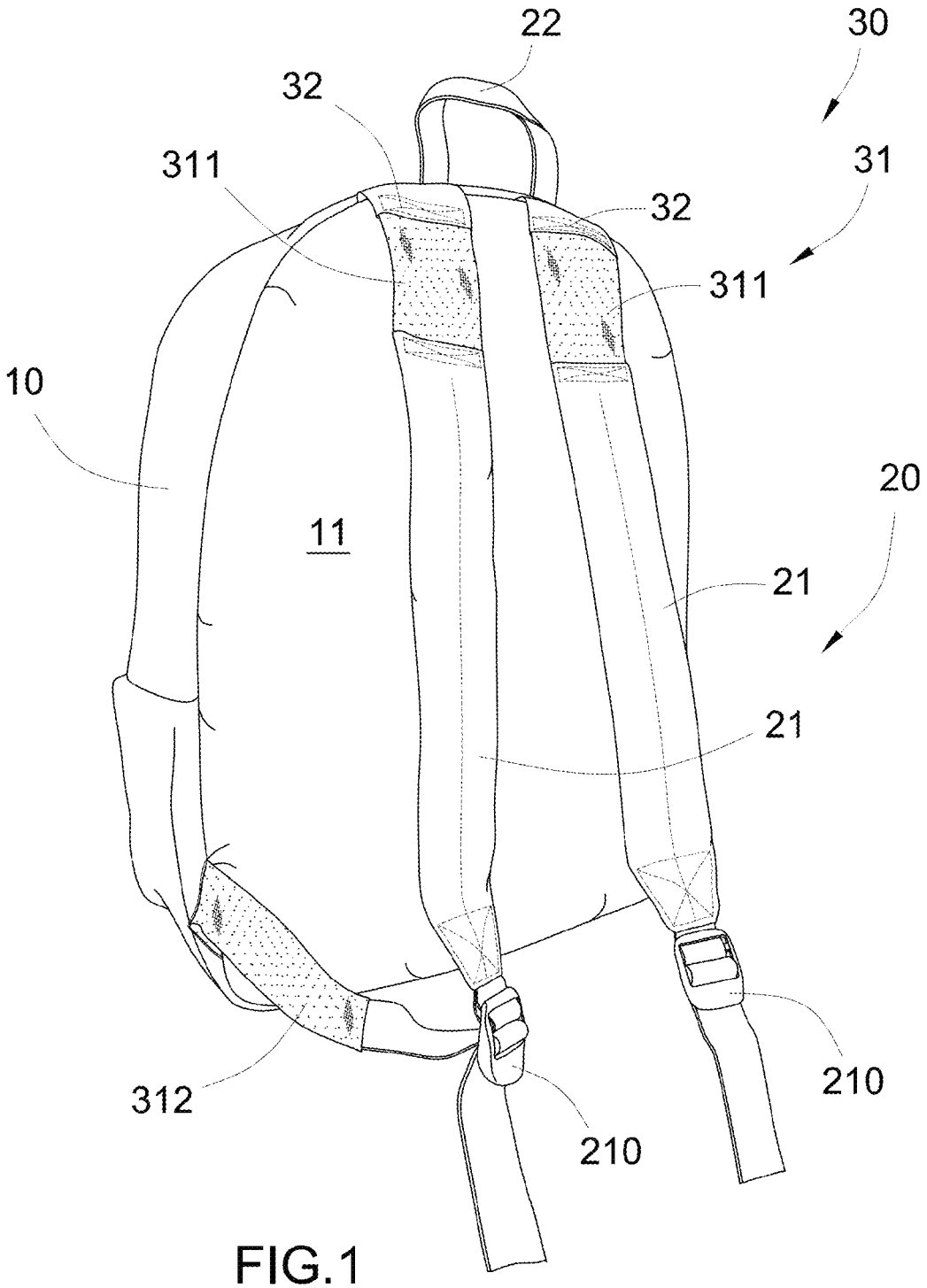


FIG.1

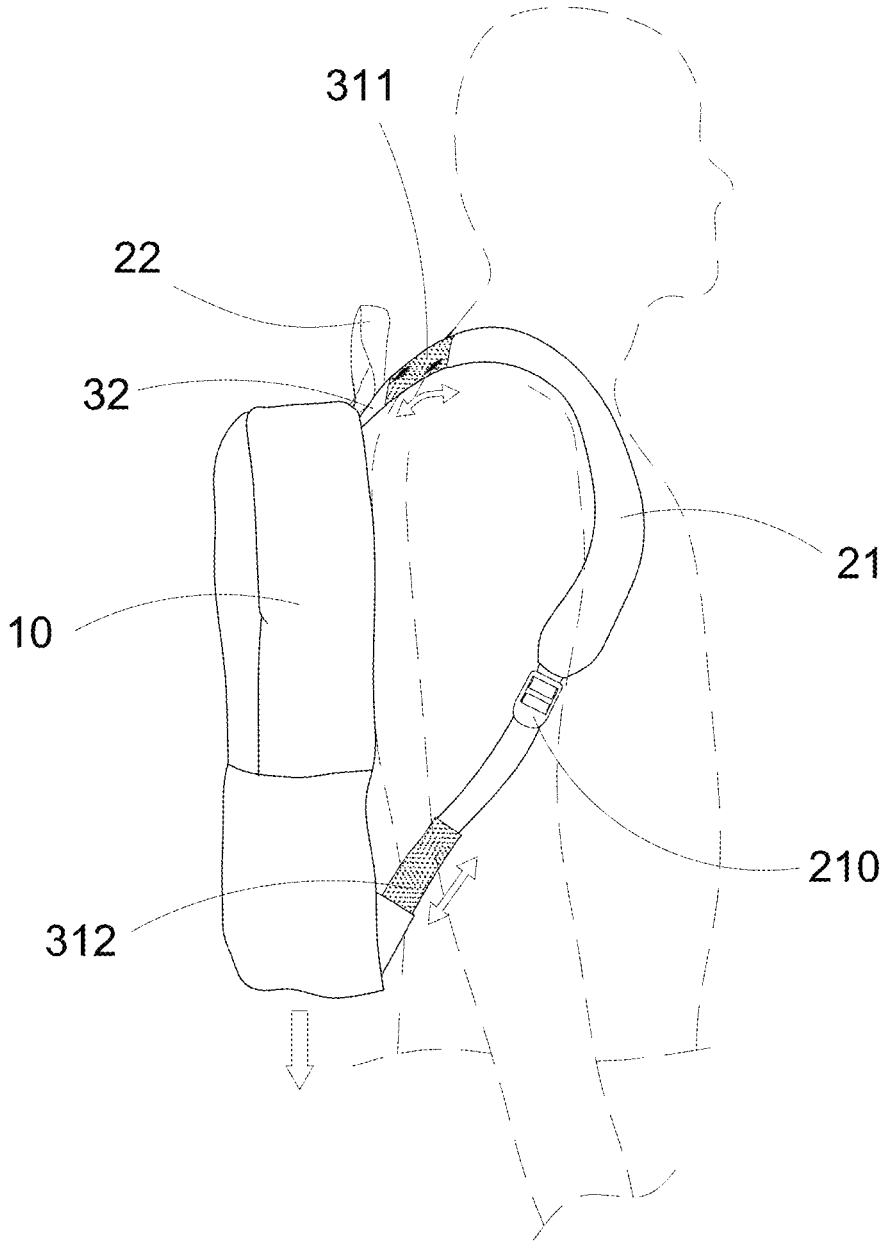


FIG.2

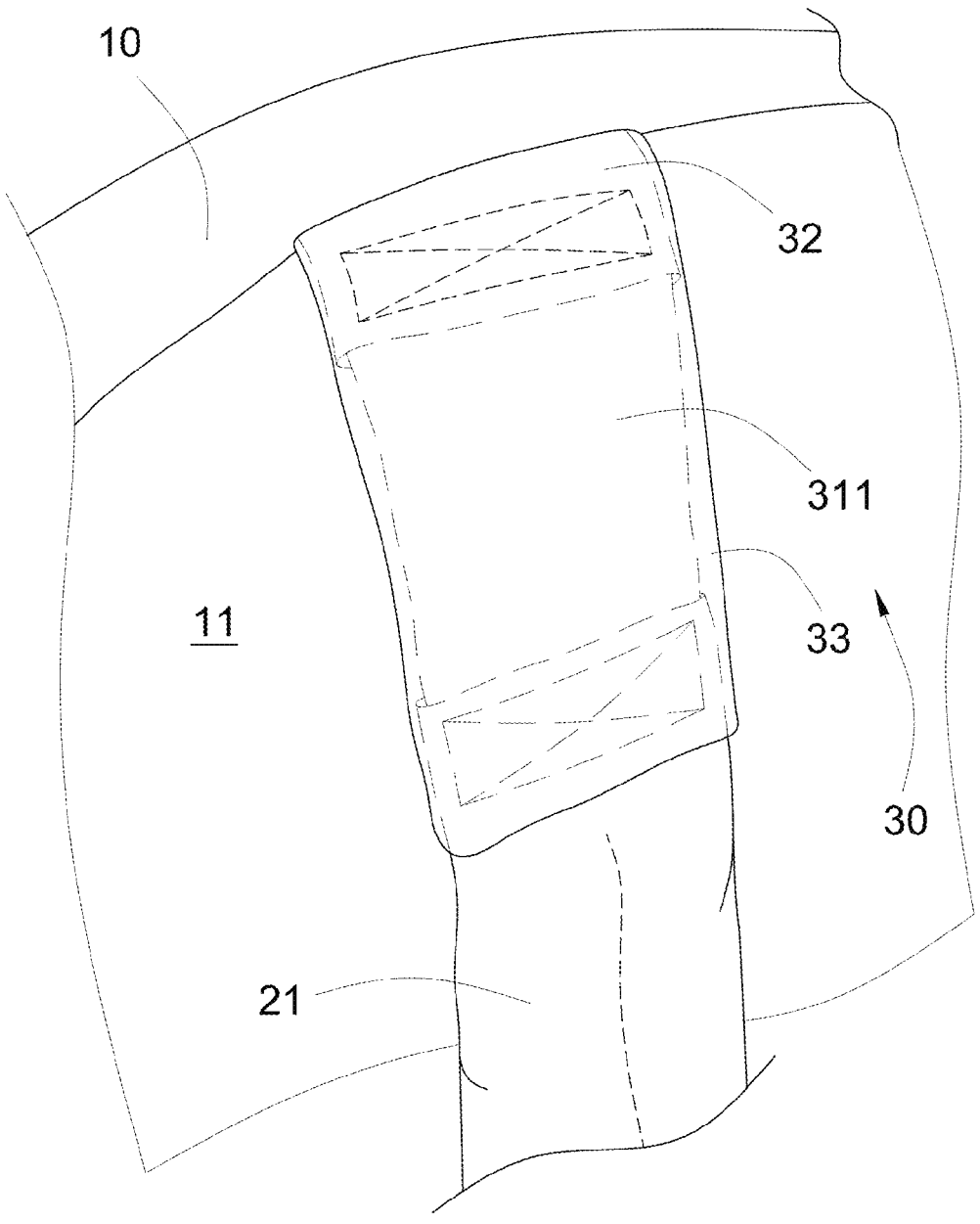


FIG.3

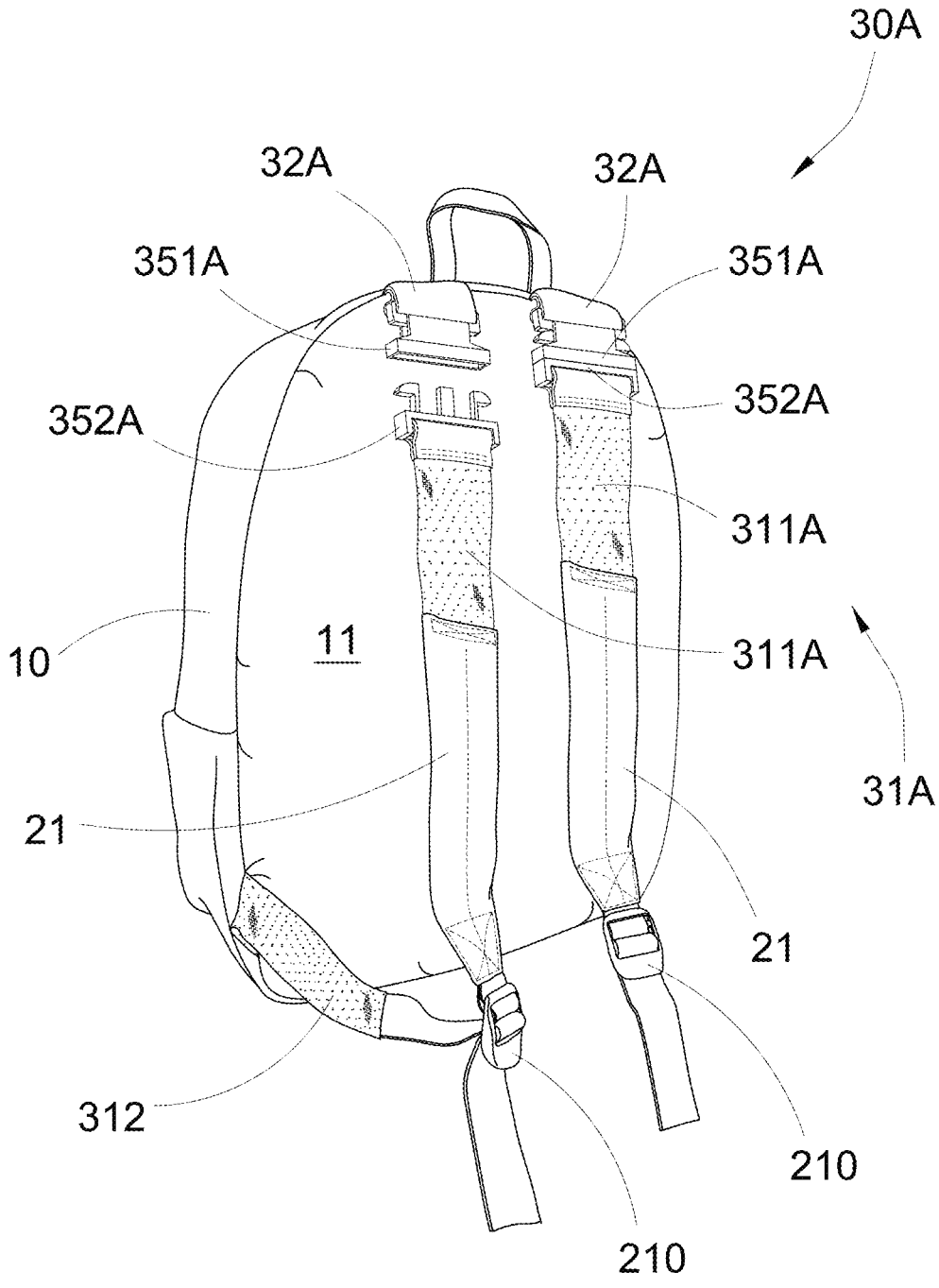

30A
32A
32A
351A
351A
352A
352A
311A
311A
10
11
31A
21
21
312
210
210

FIG.4

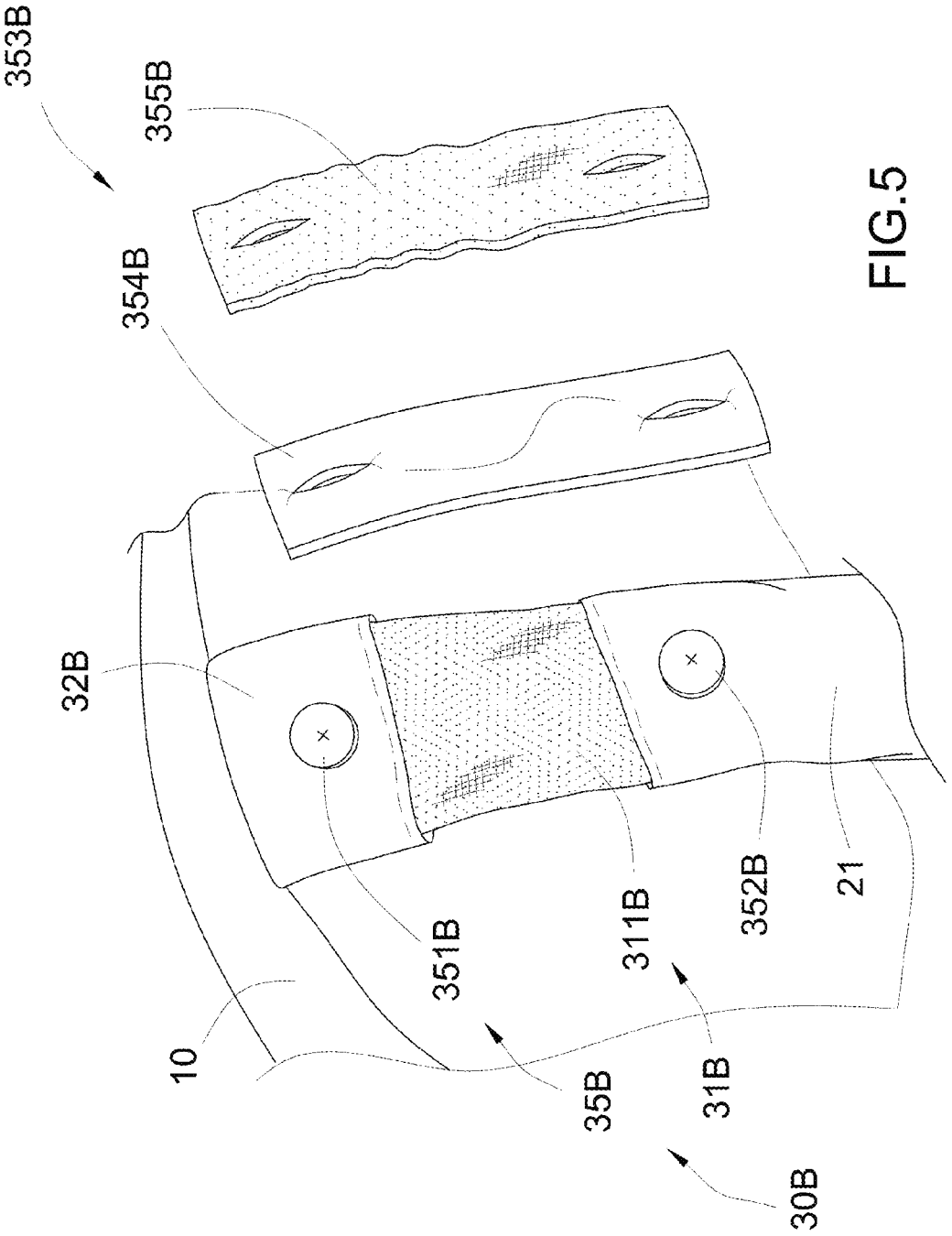


FIG.5

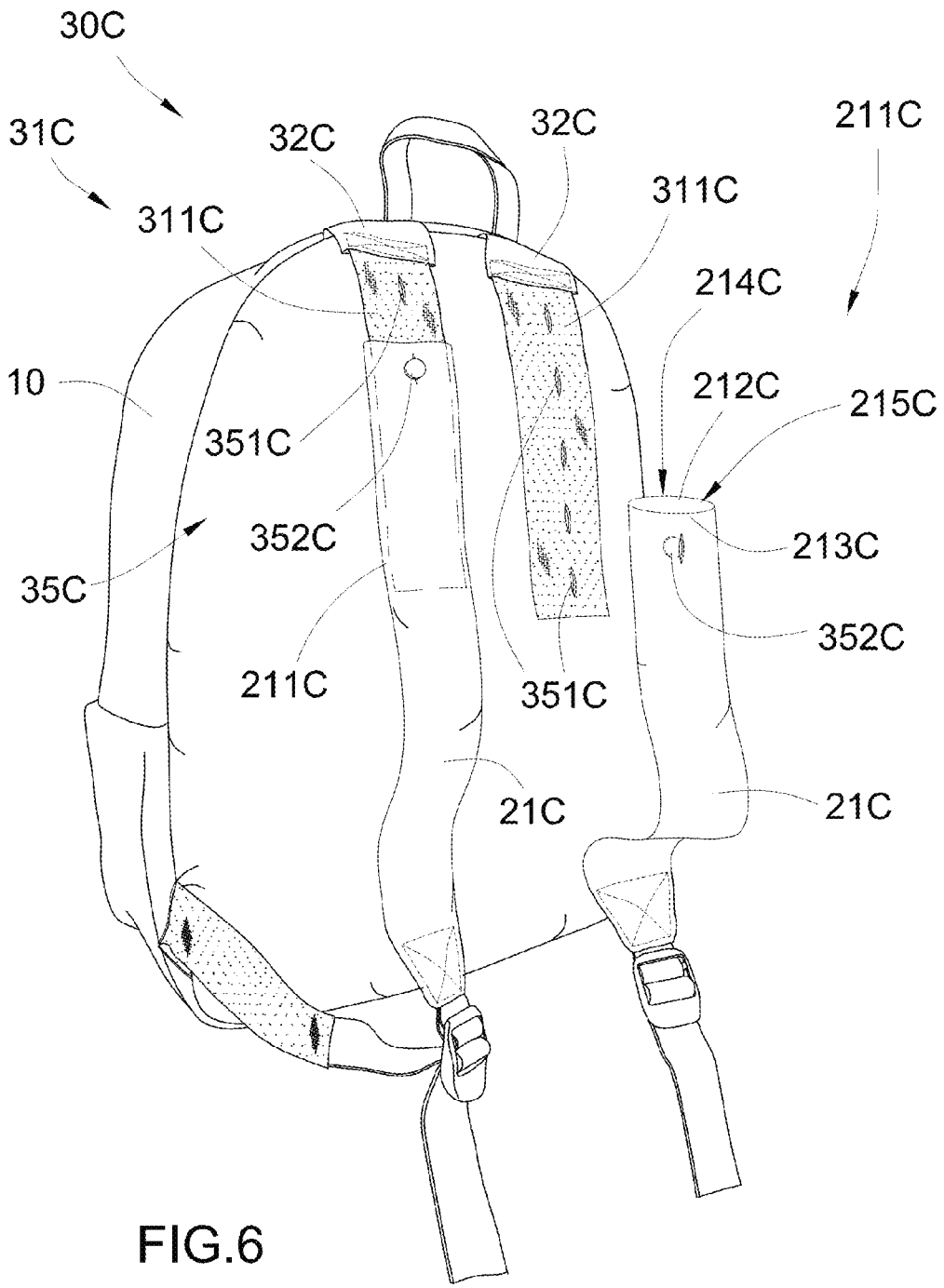

30C
31C
311C
32C
32C
311C
211C
214C
10
212C
215C
351C
352C
213C
35C
352C
211C
351C
21C
21C

FIG.6

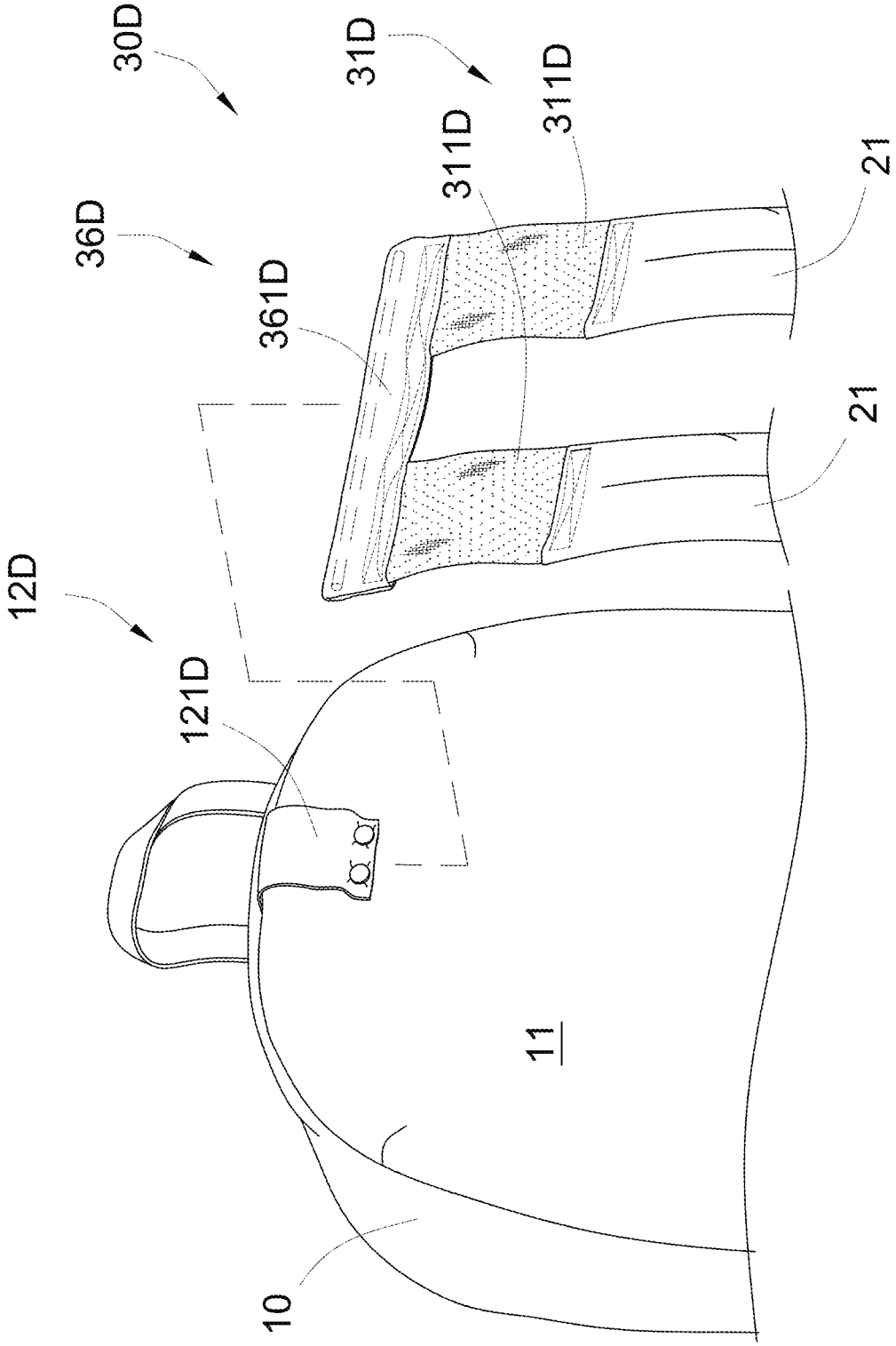


FIG.7

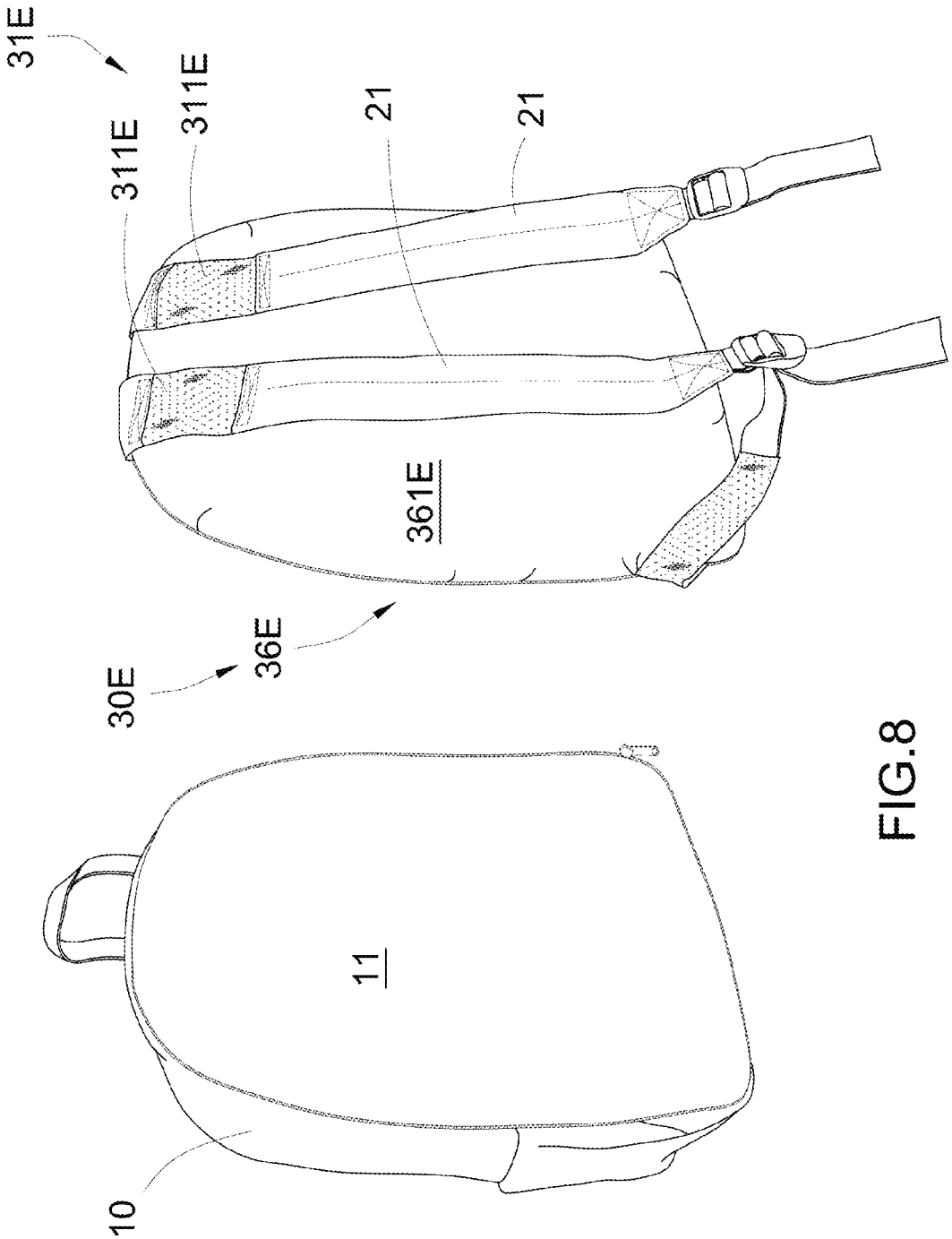


FIG.8

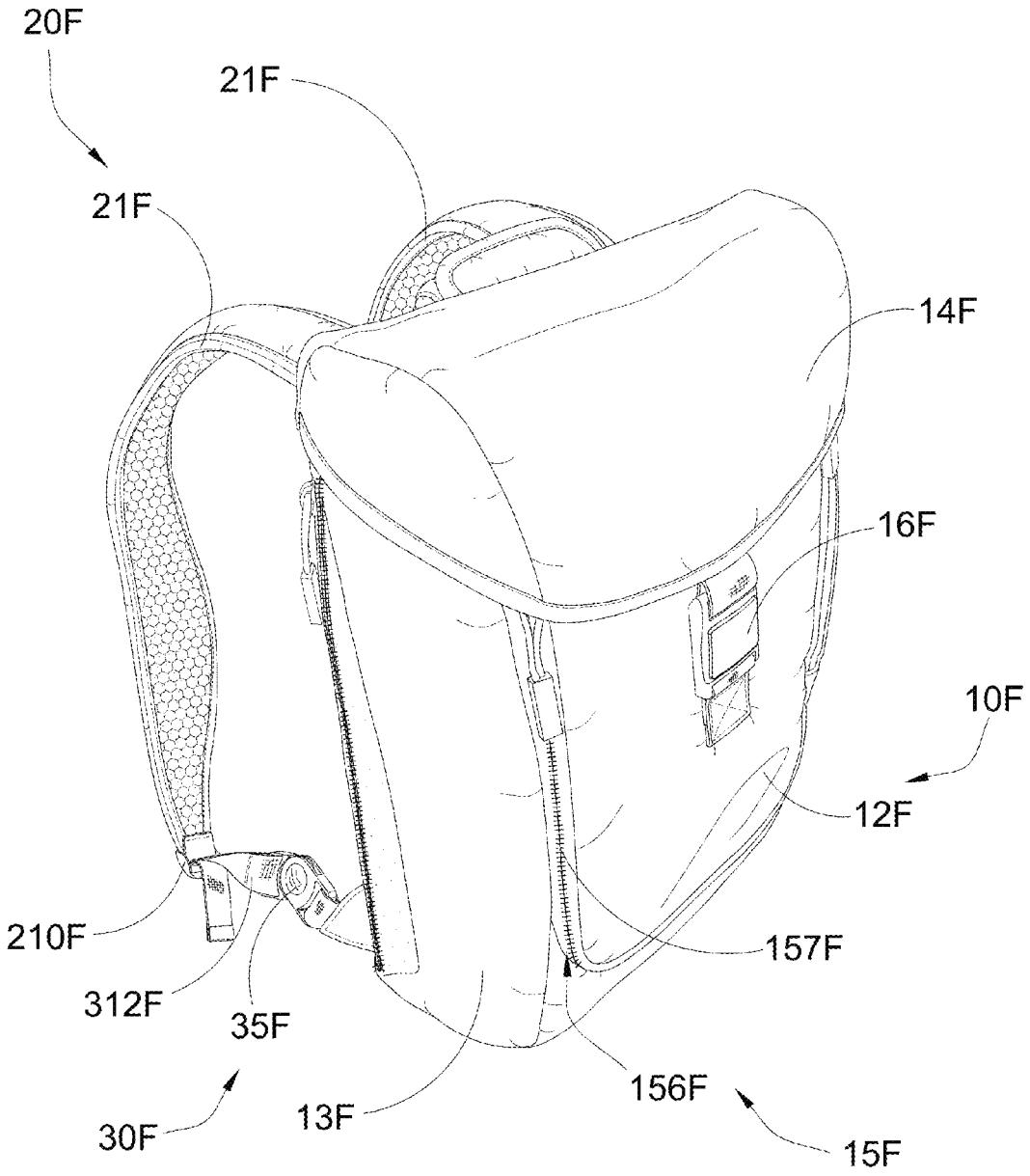


FIG.9

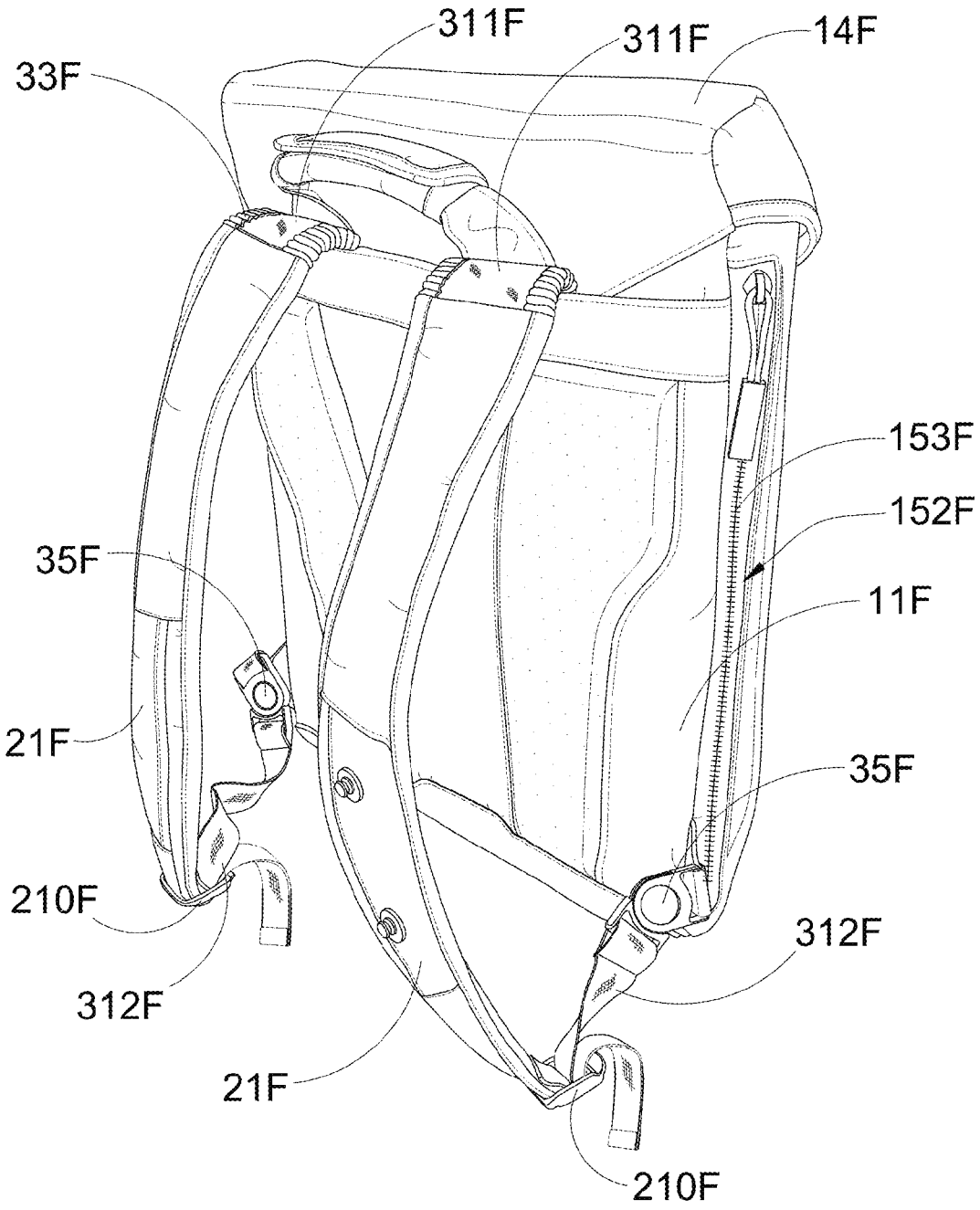

311F
311F
14F
33F
153F
152F
35F
11F
21F
35F
210F
312F
312F
21F
210F

FIG.10

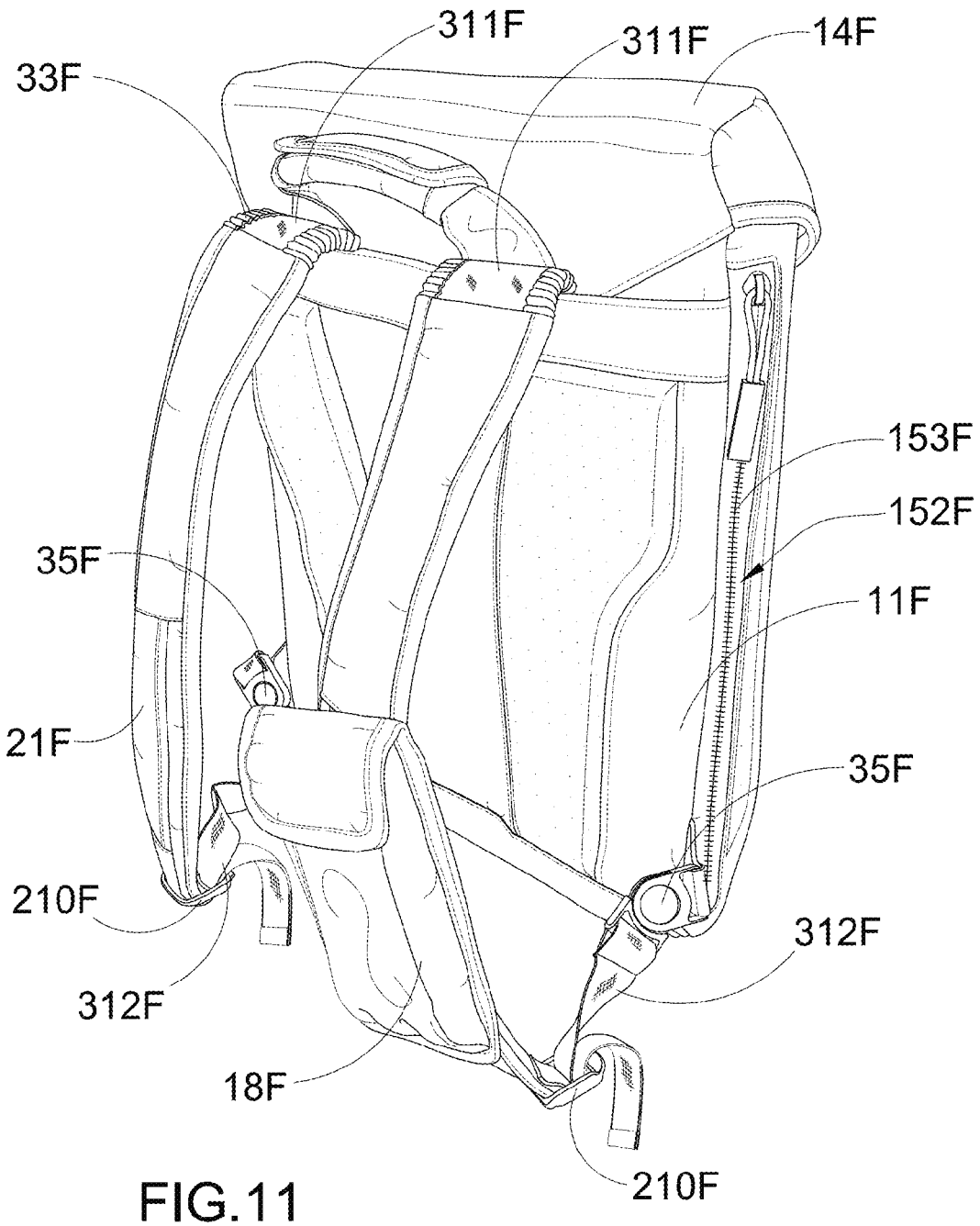

311F
311F
14F
33F
153F
152F
35F
11F
21F
35F
210F
312F
312F
18F
210F

FIG.11

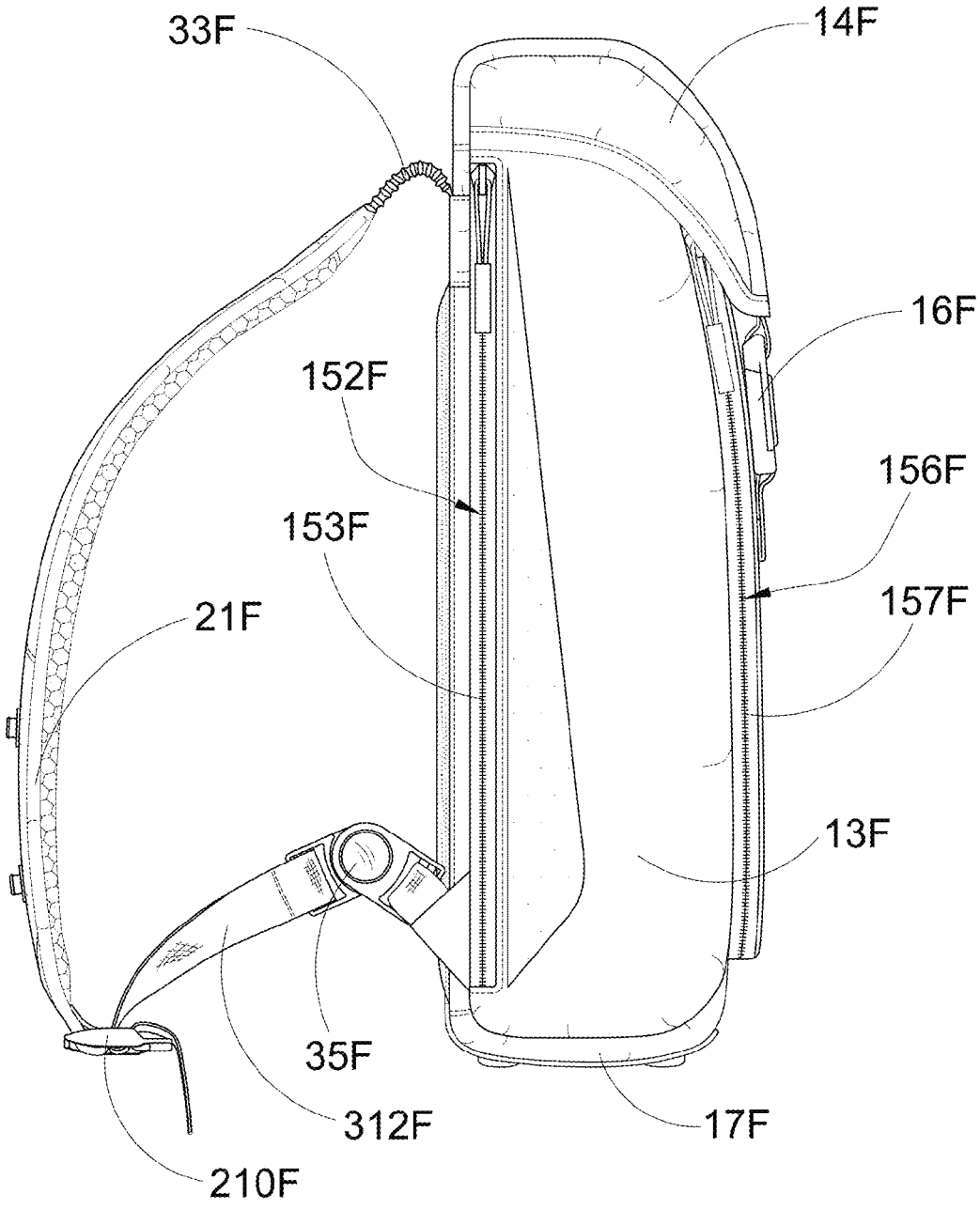


FIG.12

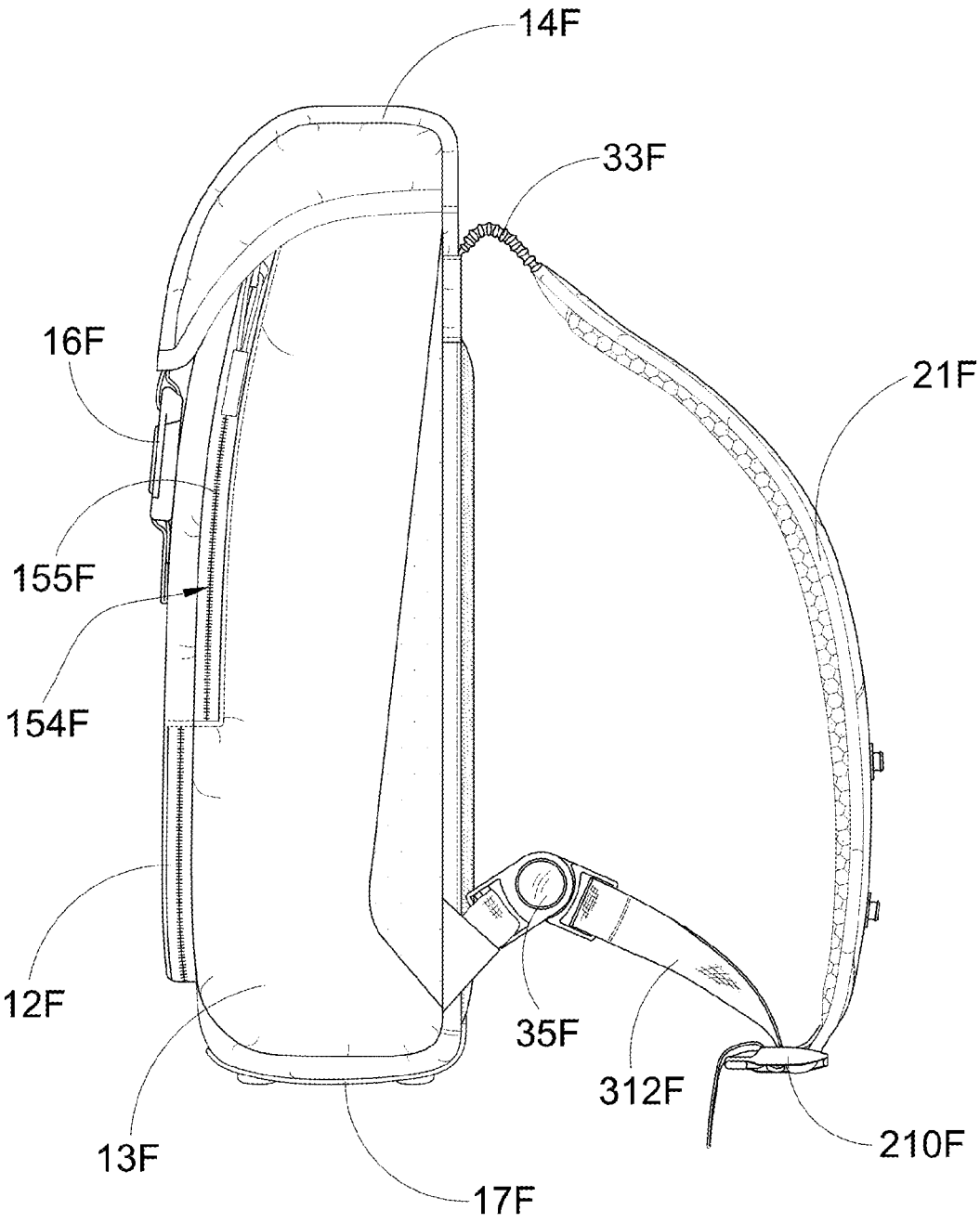


FIG.13

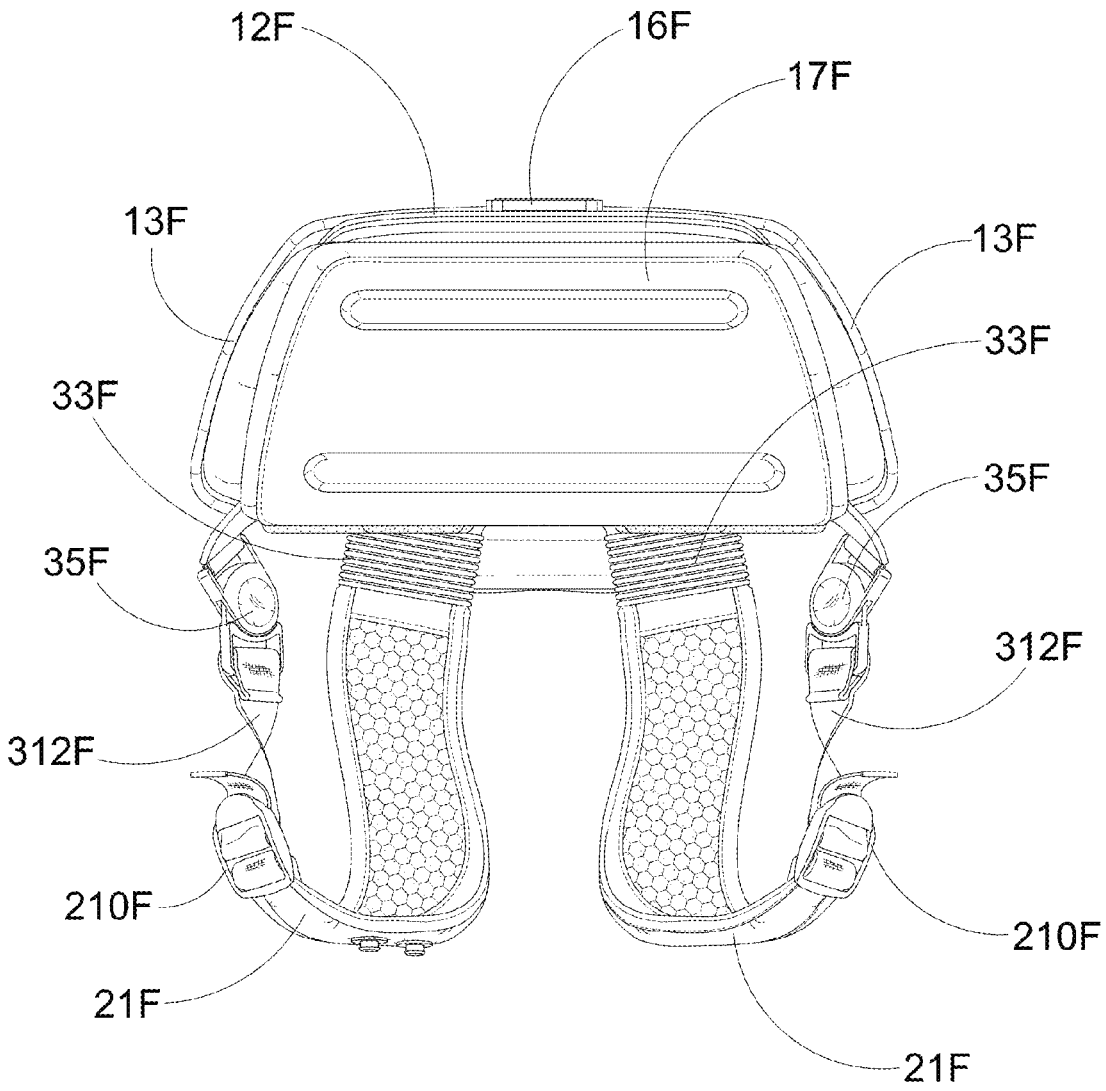


FIG.14

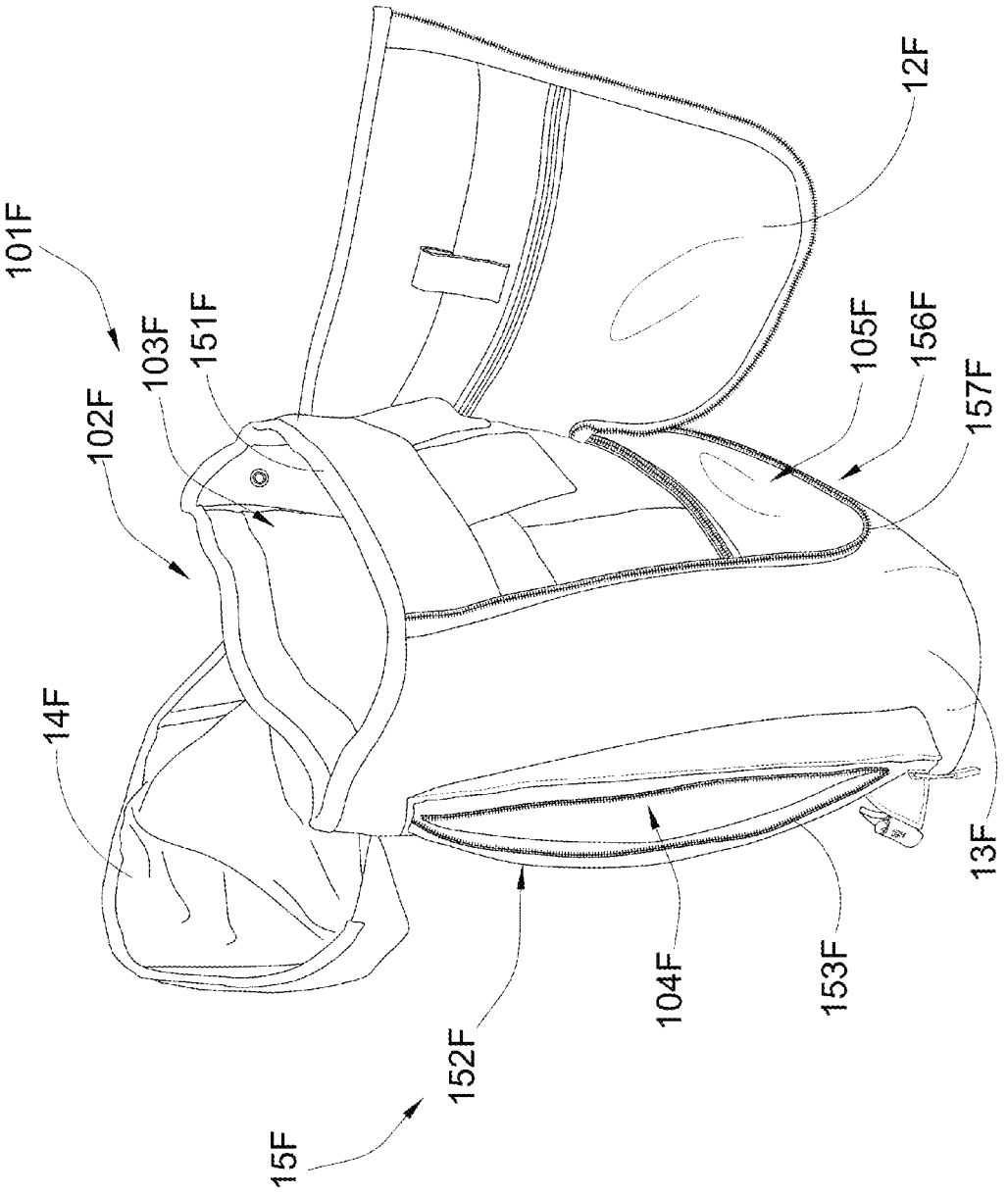

101F
103F
151F
102F
14F
15F
152F
104F
153F
13F
157F
156F
105F
12F

FIG.15

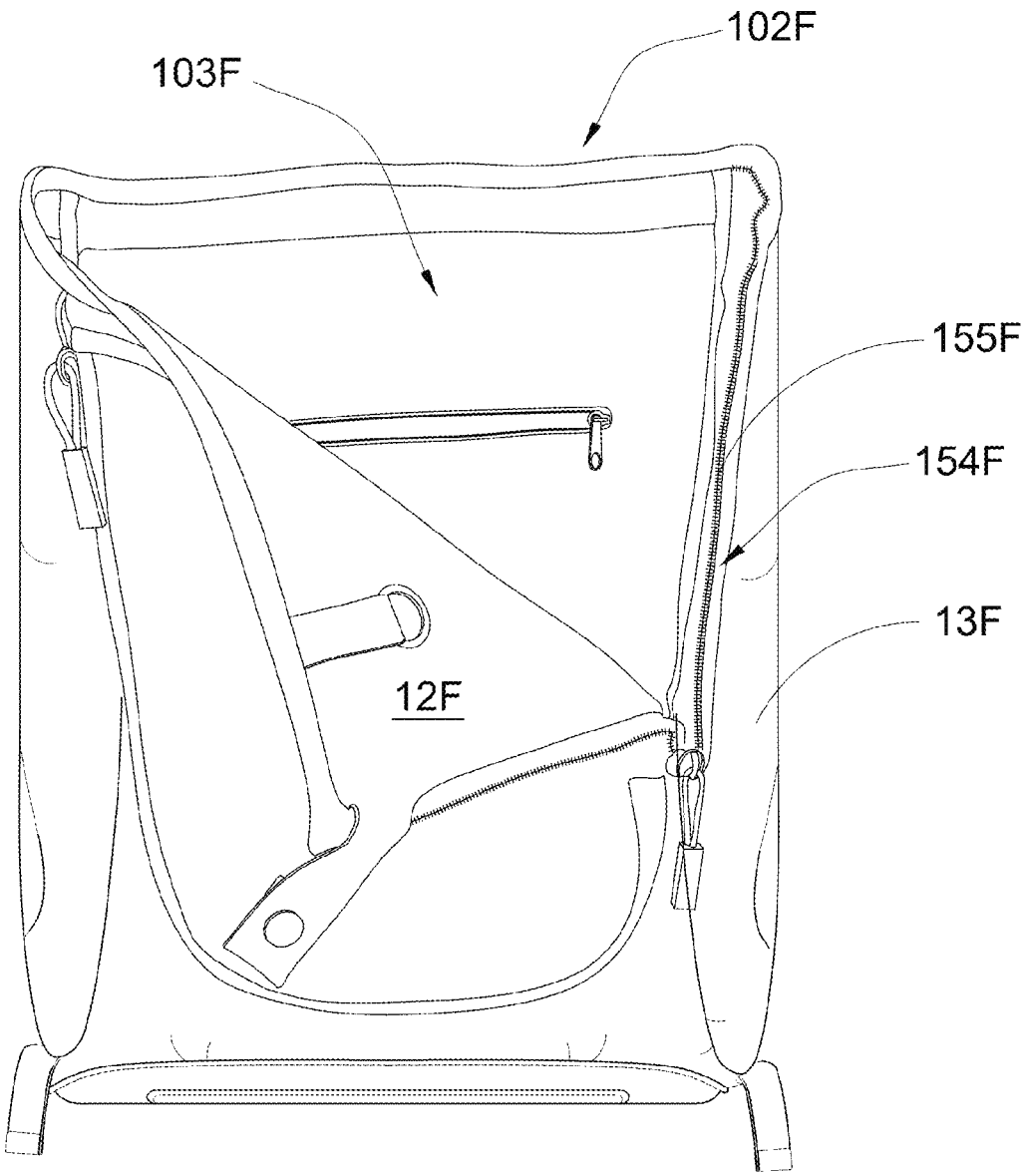


FIG.16

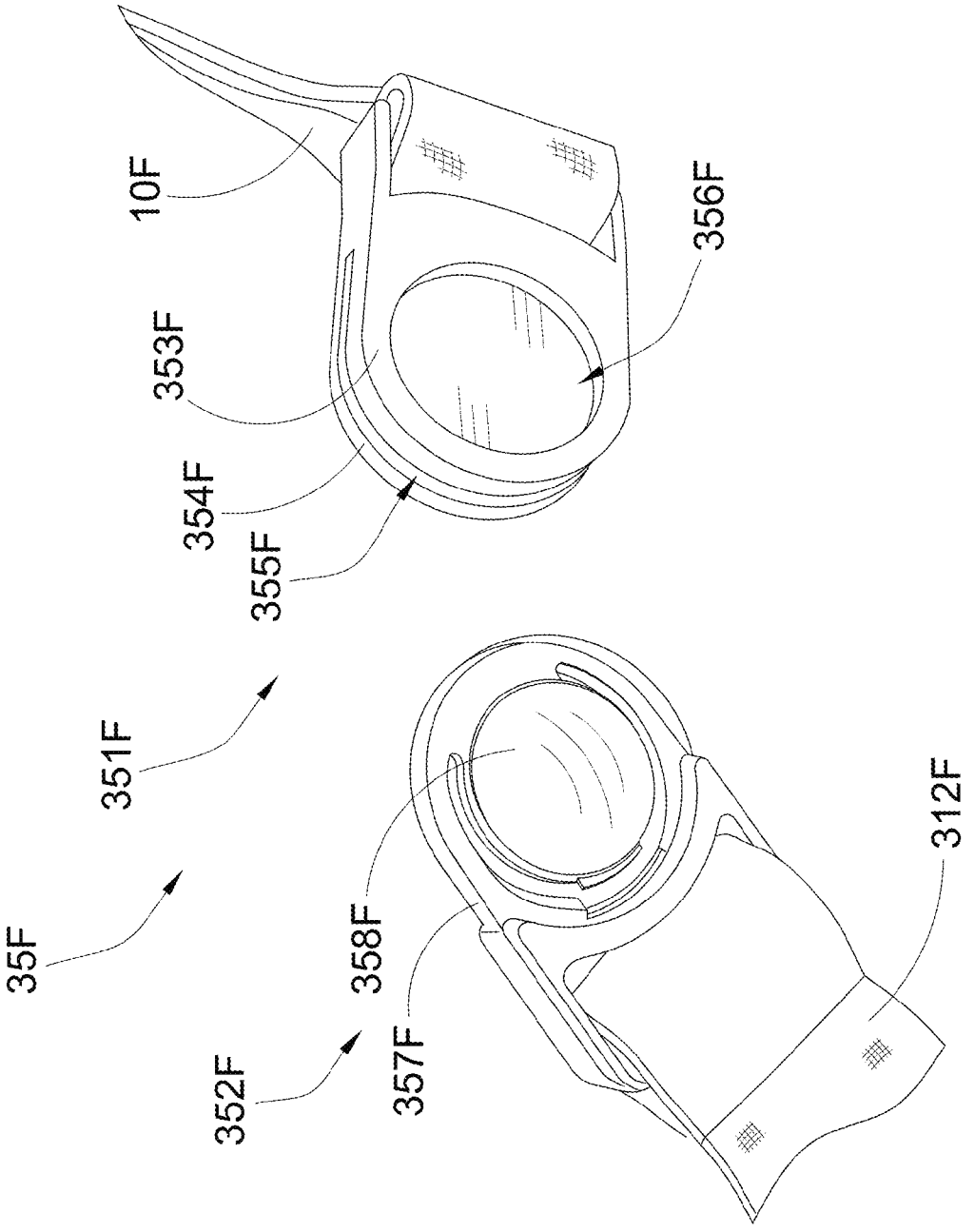


FIG.17

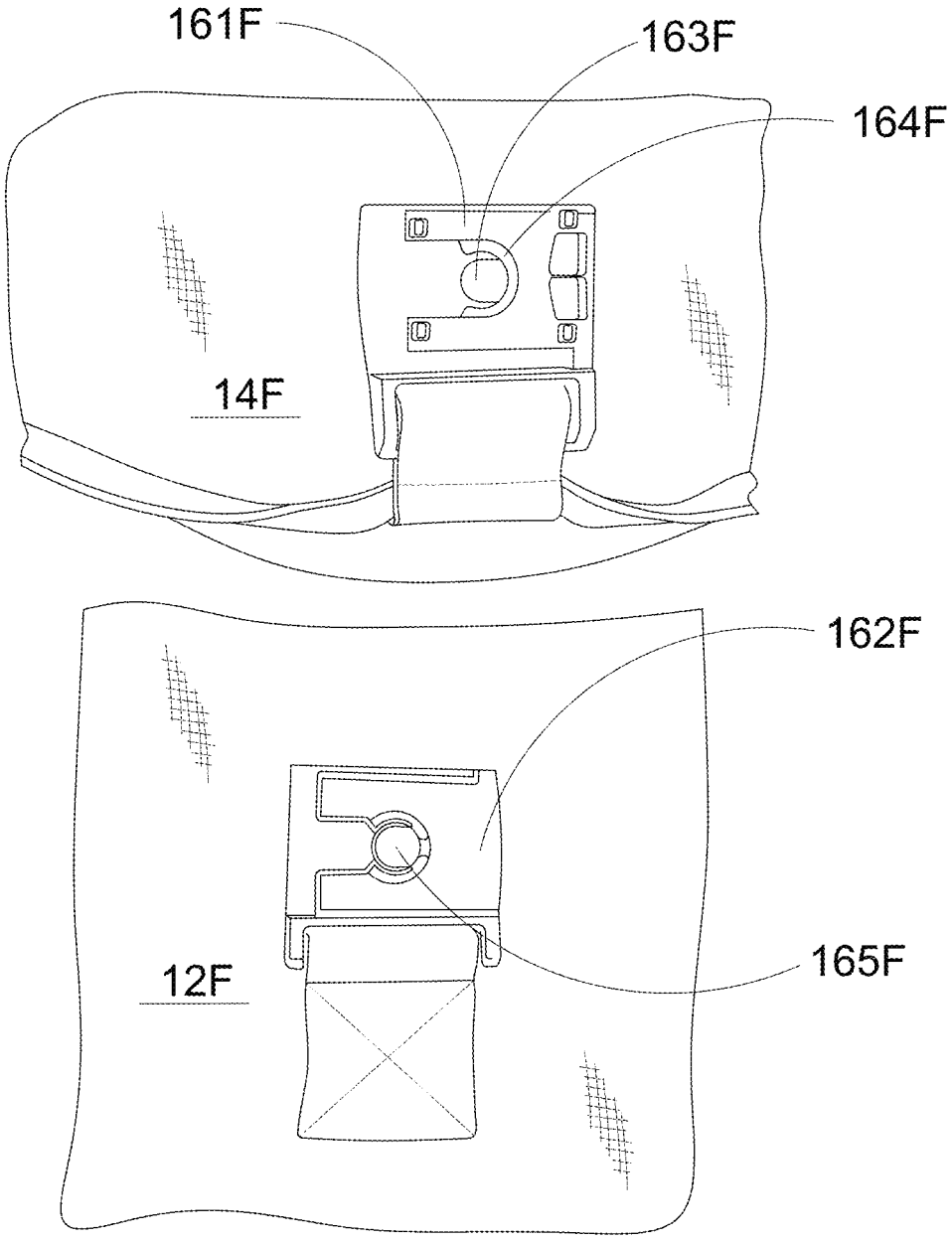


FIG.18

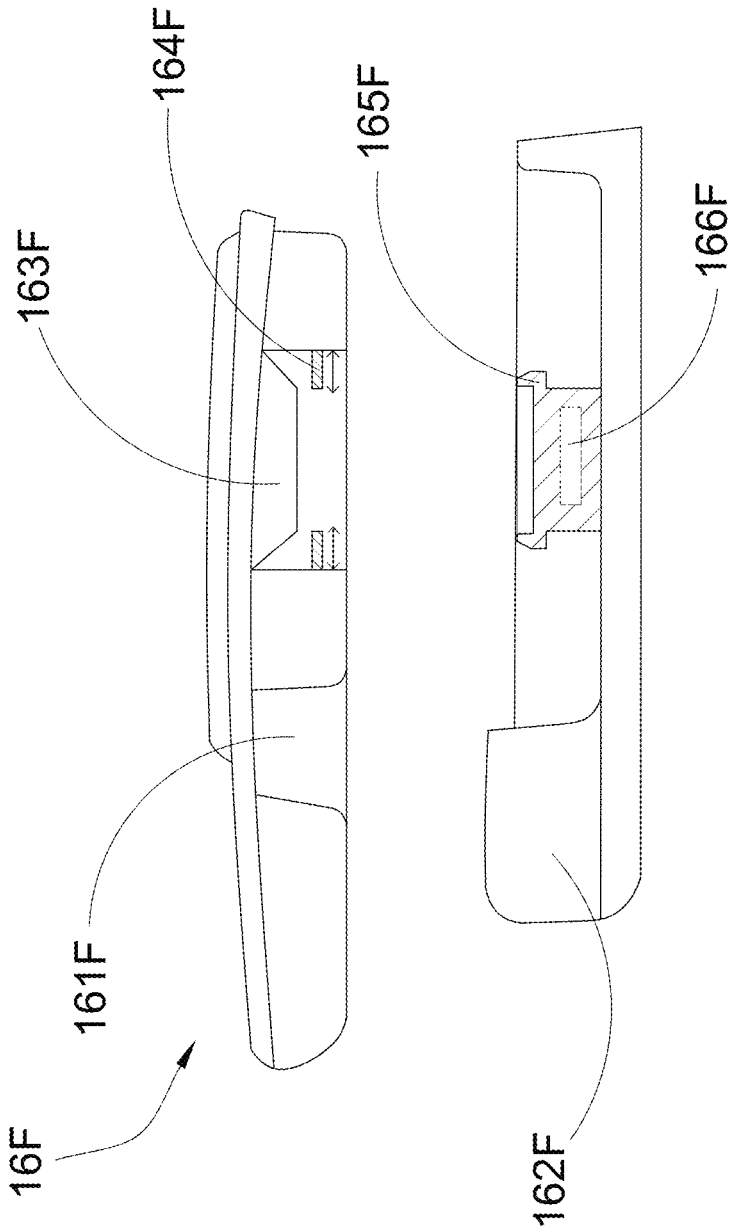


FIG.19

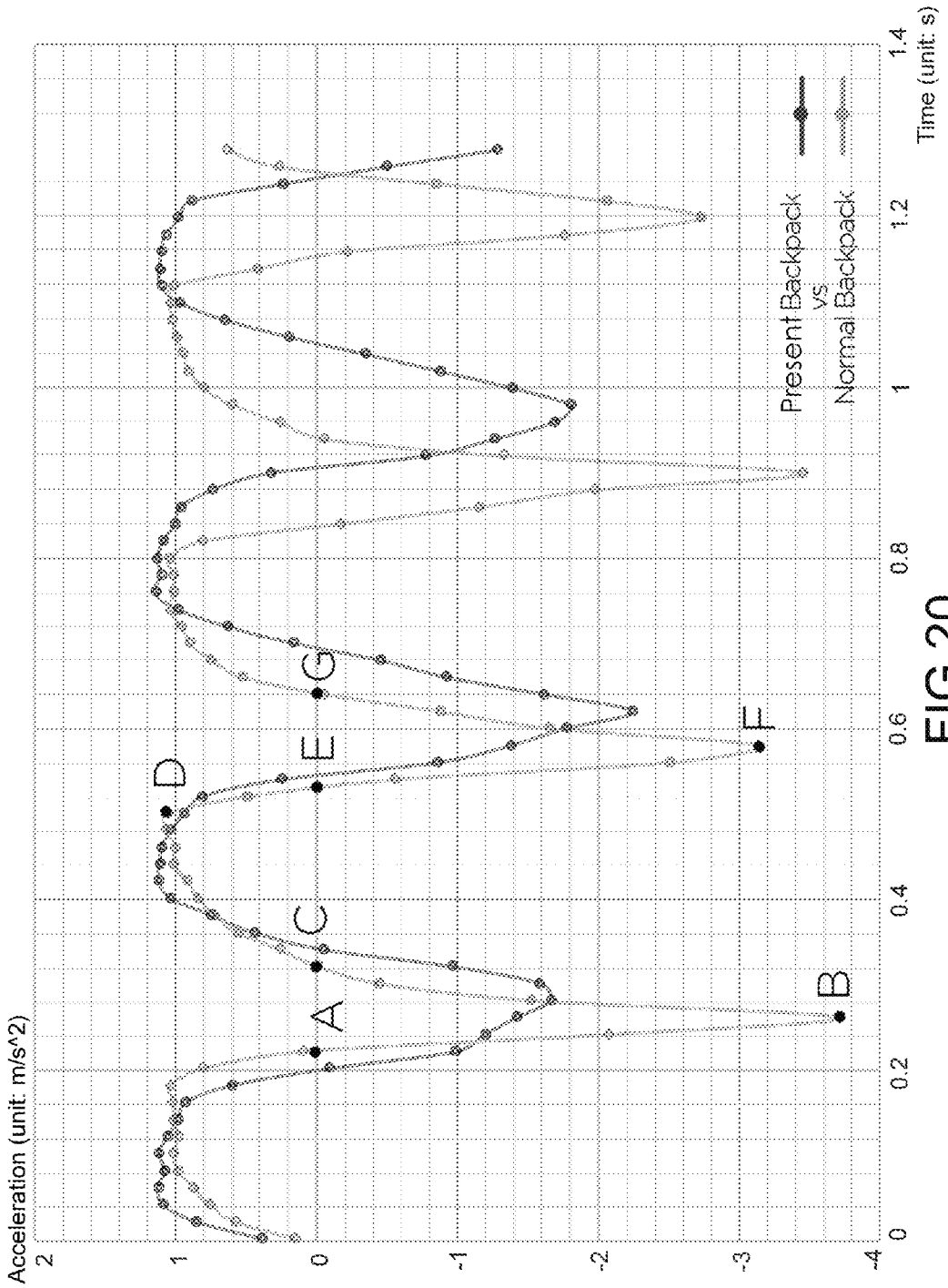

Acceleration (unit: m/s^2)
2
1
0
-1
-2
-3
-4
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Time (unit: s)
Present Backpack
vs
Normal Backpack
A
B
C
D
E
F
G

FIG.20

	Normal Backpack(unit: PSI)	Present Backpack (unit: PSI)
3 mph - Max Pressure	75	72
4 mph - Max Pressure	85	80
5 mph - Max Pressure	99	85
6 mph - Max Pressure	105	93
7 mph - Max Pressure	110	96
8 mph - Max Pressure	129	100

PSI: pound per square inch

mph: mile per hour

FIG. 21

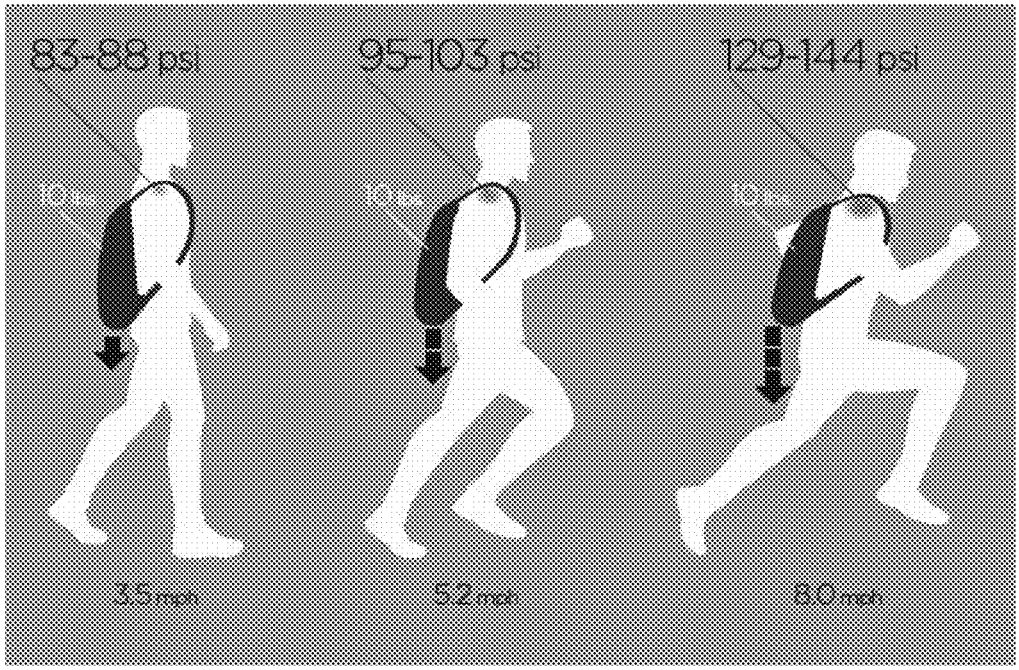


FIG. 22 (Prior Art)

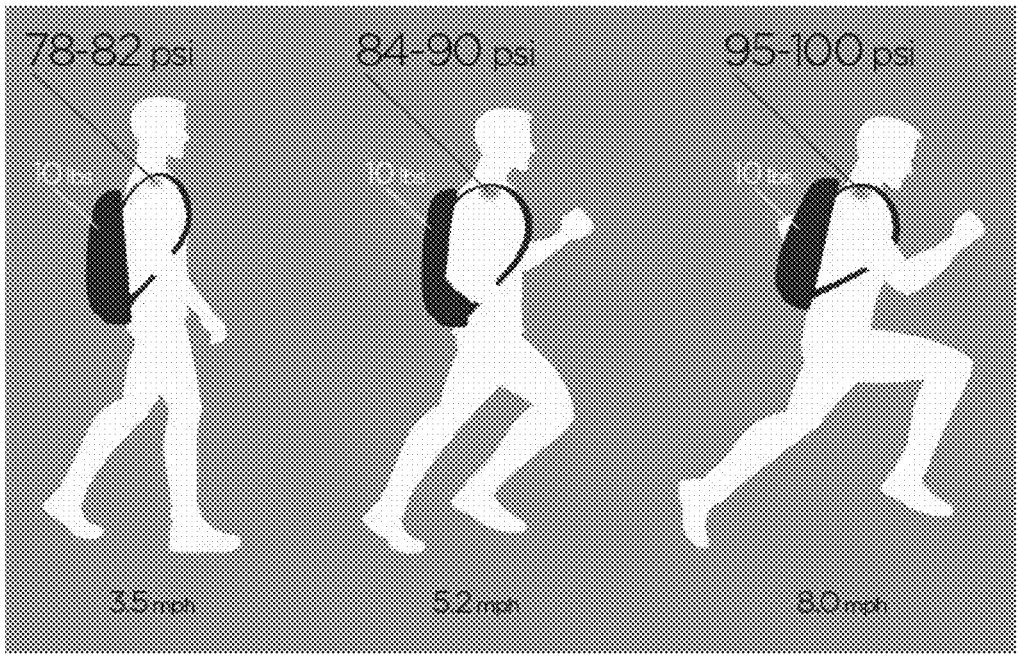


FIG. 23

BACKPACK WITH SUSPENSION ARRANGEMENT

CROSS REFERENCE OF RELATED APPLICATION

This is a Continuation-In-Part application that claims priority to U.S. non-provisional application, application Ser. No. 15/076,622, filed Mar. 21, 2016, the entire contents of each of which are expressly incorporated herein by reference.

NOTICE OF COPYRIGHT

BACKGROUND OF THE PRESENT INVENTION

Field of Invention

The present invention relates to a backpack, and more particularly to a backpack with a suspension arrangement, which suspends the load at the backpack to minimize a continuous bounding movement/force of the backpack to the wearer's body when the wearers walks or runs.

Description of Related Arts

Backpacks generally comprises a bag body and two shoulder straps extended from the bag body, wherein the backpacks rely on the shoulder straps to carry the load at the bag body, the load exerts a backward pulling force at the shoulders of the wearer, causing back fatigue and strain. Especially, students, i.e. the wearers, often carry heavy books to and from school. Therefore, musculoskeletal experts are warning the parents that a young child often has an epidemic of back problems due to the continuous use of heavy backpack. According to the American Occupational Therapy Association, a student backpack should not weight more than 15 percent of the wearer's weight. When the wearer stands still, the loading force at the bag body is a static force equal to the weight of the load. However, when the wearer walks or runs, the loading force at the bag body is larger than the weight of the load. In particular, the loading force will change at all times during the body movement of the wearer. It is because the bag body will move up and down during the body movement of the wearer, wherein a gravity force is added into the weight of the load. In other words, the rapid or vigorous body movement of the wearer will dramatically increase the loading force at the bag body. For the wearers who need to carry heavy load, such as students, campers, hikers, or golfers, the loading force may not be evenly transferred to the shoulder straps. In other words, the center of mass of the wearer will shift during the body movement of the wearer, causing the wearer to trip or fail.

An improved backpack incorporates with a suspended loading device to minimize the up and down movement of the bag body. Accordingly, the suspended loading device comprises a suspension frame, wherein the shoulder straps are coupled at one side of the suspension frame and the bag body is movably coupled at another side of the suspension frame. Due to the relative movement between the bag body and the suspension frame, the up and down movement of the bag body can be minimized to transfer to the shoulder straps. However, such suspended loading device has several drawbacks. Accordingly, the suspension frame is relatively heavy added onto the weight of the bag body. Therefore, the overall weight of the backpack, including the load at the bag body and weight of the suspension frame, will directly exert to the wearer's body through the shoulder straps. In addition, more than one item is disposed in the bag body, which causes the uneven distribution of the weight of the bag body. However, the suspended loading device can only minimize the up and down movement of the bag body but cannot evenly distribute the loading force to the shoulder straps. As a result, the wearer's body will lean toward one side where the heavier load is exerted at one of the shoulder straps.

The conventional backpack further has a drawback that the bag body only has the top opening to communicate with the bag cavity in the bag body, wherein the top opening is defined at a top rim of the bag body. In particular, the bag body has an elongated shape that a length of the bag body is larger than a width thereof. As a result, the wearer will put or take the items in the bag cavity of the bag body through the top opening thereof. As a result, the wearer is unable to take the items at the bottom of the bag cavity through the top opening because the items at the bottom of the bag cavity are covered by and hidden under the items at the top of the bag cavity. In other words, the wearer must take out the items at the top of the bag cavity in order to access the bottom thereof. Furthermore, the wearer would like to carry a portable electronic device, such as laptop or tablet computer, by the backpack that the portable electronic device and different items are mixed and stored in the bag cavity. Even though the portable electronic device can be protected from any external force at the bag body, the portable electronic device is collided with the items within the bag body. It is worth mentioning that when the portable electronic device is taken out of the bag cavity, it is always a hard time for the wearer to put back the portable electronic device into the bag cavity at its original position.

SUMMARY OF THE PRESENT INVENTION

The invention is advantageous in that it provides a backpack with a suspension arrangement, which suspends the load at the backpack to minimize a continuous bounding movement/force of the backpack to the wearer's body when the wearers walks or runs.

Another advantage of the invention is to a backpack with a suspension arrangement, which comprises a resilient unit provided between a pack body and two shoulder straps for absorbing a bounding force of the pack body. Therefore, the resilient unit allows a relative movement of the pack body with respect to each of the shoulder straps but minimizes the relative movement of the pack body by absorbing the bounding force of the pack body.

Another advantage of the invention is to a backpack with a suspension arrangement, wherein the resilient unit is adapted for evenly distributing a loading force of the pack body to each of the shoulder straps, such that the resilient unit can absorb the bounding force of the pack body at different directions, such as an up-and-down direction or a lateral direction.

Another advantage of the invention is to a backpack with a suspension arrangement, wherein the suspension arrangement not only minimizes any up-and-down movement of the backpack but also reduces any sideward swinging movement of the backpack.

Another advantage of the invention is to a backpack with a suspension arrangement, wherein a tension of the resilient unit is adjustable to incorporate with the backpack depending on the load thereat. Therefore, the wearer is able to increase the tension of the resilient unit for carrying a heavier load at the backpack or decrease the tension of the resilient unit for carrying a lighter load at the backpack.

Another advantage of the invention is to a backpack with a suspension arrangement, wherein the pack body has an accessing arrangement for enlarging an opening area of the pack body, such that the wearer is able to easily access the bottom of the storage cavity via the enlarged opening area.

Another object of the present invention is to provide a backpack with a suspension arrangement, which does not require to alter the original structural design of the backpack, so as to minimize the manufacturing cost of the backpack incorporating with the suspension arrangement.

Another object of the present invention is to provide a backpack with a suspension arrangement, wherein no expensive or complicated structure is required to employ in the present invention in order to achieve the above mentioned objects. Therefore, the present invention successfully provides an economic and efficient solution for minimizing any continuous bounding movement/force of the backpack to the wearer's body when the wearers walks or runs so as to prevent the cause of the back fatigue and strain for the wearer.

Additional advantages and features of the invention will become apparent from the description which follows, and may be realized by means of the instrumentalities and combinations particular point out in the appended claims.

According to the present invention, the foregoing and other objects and advantages are attained by a backpack, comprising:

a pack body configured for being disposed on a wearer's back;

a carrying system which comprises two length-adjustable shoulder straps extended from the pack body for allowing the wearer to wear the pack body at the wearer's back; and

a suspension arrangement which comprises a resilient unit provided between the pack body and the shoulder straps for absorbing a bounding force of the pack body and for evenly distributing a loading force of the pack body to each of the shoulder straps so as to minimize a relative movement of the pack body with respect to each of the shoulder straps.

Still further objects and advantages will become apparent from a consideration of the ensuing description and drawings.

These and other objectives, features, and advantages of the present invention will become apparent from the following detailed description, the accompanying drawings, and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a rear perspective view of a backpack with a suspension arrangement according to a preferred embodiment of the present invention.

FIG. **2** is a side view of the backpack with the suspension arrangement worn by a wearer according to the above preferred embodiment of the present invention.

FIG. **3** is a perspective view of the suspension arrangement of the backpack according to the above preferred embodiment of the present invention.

FIG. **4** illustrates a first alternative mode of the suspension arrangement of the backpack according to the above preferred embodiment of the present invention, illustrating the detachable feature of the suspension arrangement.

FIG. **5** illustrates a second alternative mode of the suspension arrangement of the backpack according to the above preferred embodiment of the present invention, illustrating the tension adjustment of the suspension arrangement.

FIG. **6** illustrates a third alternative mode of the suspension arrangement of the backpack according to the above preferred embodiment of the present invention, illustrating the alternative tension adjustment of the suspension arrangement.

FIG. **7** illustrates a fourth alternative mode of the suspension arrangement of the backpack according to the above preferred embodiment of the present invention.

FIG. **8** illustrates a fifth alternative mode of the suspension arrangement of the backpack according to the above preferred embodiment of the present invention.

FIG. **9** is a front perspective view of a backpack with a suspension arrangement according to a second preferred embodiment of the present invention.

FIG. **10** is a rear perspective view of the backpack with the suspension arrangement according to the second preferred embodiment of the present invention.

FIG. **11** is a rear perspective view of the backpack with the suspension arrangement according to the second preferred embodiment of the present invention, illustrating a front detachable pocket coupled at the shoulder strap.

FIG. **12** is a left side view of the backpack with the suspension arrangement according to the second preferred embodiment of the present invention.

FIG. **13** is a right side perspective view of the backpack with the suspension arrangement according to the second preferred embodiment of the present invention.

FIG. **14** is a bottom view of the backpack with the suspension arrangement according to the second preferred embodiment of the present invention.

FIG. **15** is a partially perspective view of the backpack with the suspension arrangement according to the second preferred embodiment of the present invention, illustrating the front cavity, the rear cavity, and the front pocket of the pack body.

FIG. **16** is a front view of the backpack with the suspension arrangement according to the second preferred embodiment of the present invention, illustrating the enlarging slit.

FIG. **17** illustrates the strap fastening unit of the backpack according to the second preferred embodiment of the present invention.

FIG. **18** is a perspective view of a cover locker of the backpack according to the second preferred embodiment of the present invention.

FIG. **19** is a side view of the cover locker of the backpack according to the second preferred embodiment of the present invention.

FIG. **20** is a graph illustrating the loading force applied at the shoulders of the wearer by the present invention and the normal backpack.

FIG. **21** is a table illustrating the maximum pressure applied to the shoulders of the wearer with respect to the acceleration thereof for the present backpack and the normal backpack.

FIG. **22** illustrates the pressure on the shoulders of the wearer when wearing the conventional backpack.

FIG. **23** illustrates the pressure on the shoulders of the wearer when wearing the backpack of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The following description is disclosed to enable any person skilled in the art to make and use the present

invention. Preferred embodiments are provided in the following description only as examples and modifications will be apparent to those skilled in the art. The general principles defined in the following description would be applied to other embodiments, alternatives, modifications, equivalents, and applications without departing from the spirit and scope of the present invention.

Referring to FIGS. **1** and **2** of the drawings, a backpack according to a preferred embodiment of the present invention is illustrated, wherein the backpack, which is an ergonomic backpack, comprises a pack body **10**, a carrying system **20**, and a suspension arrangement **30**.

The pack body **10** is configured for being disposed on a wearer's back, wherein the pack body **10** has a storage cavity for receiving one or more items as a load of the pack body **10**, wherein the pack body **10** has a back side **11**.

The carrying system **20** comprises two length-adjustable shoulder straps **21** extended from the pack body **10** for allowing the wearer to wear the pack body **10** at the wearer's back. Preferably, the shoulder straps **21** are provided at the back side **11** of the pack body **10**. The carrying system **20** further comprises a handle loop **22** provided on a top side of the pack body **10**. Each of the shoulder straps **21** has a strap slide **210** to selectively adjust a length of the shoulder strap **21**. It is worth mentioning that the strap slide **210** can also allow the lower end of the shoulder strap **21** to be detached from the pack body **10**.

The suspension arrangement **30** comprises a resilient unit **31** provided between the pack body **10** and the shoulder straps **21**, wherein the resilient unit **31** allows a relative movement of the pack body **10** with respect to each of the shoulder straps **21**. Accordingly, the conventional backpack is constructed that the shoulder straps are affixed to the bag body, such that conventional backpack does not provide any means for allowing the relative movement of the bag body with respect to the shoulder straps. As a result, the loading force is directly exerted to the shoulder straps from the bag body. In view of the present invention, the resilient unit **31** provides a predetermined tension between the pack body **10** and the shoulder straps **21**, such that the pack body **10** can be relatively moved with respect to the shoulder straps **21**.

In particular, the resilient unit **31** of the present invention generates a predetermined resilient force between the pack body **10** and the shoulder straps **21** for absorbing a bounding force of the pack body **10**, especially when the wearers walks or runs, to minimize the relative movement of the pack body **10** with respect to each of the shoulder straps **21**. As it is mentioned above, if there is no relative movement of the pack body **10** with respect to the shoulder straps **21**, the loading force is directly exerted to the shoulder straps **21** from the pack body **10**. On the other hand, when there is a relative large movement of the pack body **10** with respect to the shoulder straps **21**, the bounding force of the pack body **10** will be varied in response to the movement of the pack body **10**, causing the backpack to be worn uncomfortably. Therefore, the resilient unit **31** of the present invention allows the relative movement of the pack body **10** with respect to each of the shoulder straps **21** but minimizes the relative movement of the pack body **10** by absorbing the bounding force of the pack body **10**.

The resilient unit **31** is also provided at the shoulder straps **21** individually for evenly distributing the loading force of the pack body **10** to each of the shoulder straps **21**, such that the resilient unit **31** can absorb the bounding force of the pack body **10** at different directions, such as an up-and-down direction or a lateral direction. For example, when the items are unevenly disposed in the pack body **10**, the loading force may not be exerted at a centerline of the pack body **10**. As a result, the loading force may be evenly distributed to the shoulder straps **21**. Since the resilient unit **31** of the present invention is provided at the shoulder straps **21** individually, the resilient unit **31** will generate the independent resilient force at each of the shoulder straps **21** to balance the uneven loading force at the pack body **10**, such that the loading force can be evenly distributed the loading force of the pack body **10** to each of the shoulder straps **21**.

As shown in FIG. **1**, the resilient unit **31** comprises two resilient straps **311** extended from upper ends of the shoulder straps **21** respectively to the pack body **10**, wherein each of the resilient straps **311** provides the resilient force to absorb the bounding force of the pack body **10** to the respective shoulder strap **21**. In other words, the two resilient straps **311** provide the independent resilient forces at the shoulder straps **21** respectively to individually absorb the bounding force of the pack body **10**.

The resilient unit **31** further comprises two lower resilient straps **312** extended from lower ends of the shoulder straps **21** respectively to the pack body **10**, wherein the lower resilient straps **312** will also provide the resilient force to absorb the bounding force of the pack body **10** to the respective shoulder strap **21**. The resilient straps **311**, **312** are made of stretchable material to generate the resilient force. Preferably, the resilient straps **311** are permanently affixed between the upper ends of the shoulder straps **21** and the pack body **10**, and the lower resilient straps **312** are permanently affixed between the lower ends of the shoulder straps **21** and the pack body **10**. It is worth mentioning that the strap slide **210** can also allow the lower end of the shoulder strap **21** to be detached from the lower resilient straps **312** so as to detach the lower end of the shoulder strap **21** from the pack body **10**.

Accordingly, the two resilient straps **311** at the upper ends of the shoulder straps **21** serve as two upper resilient straps **311**, such that each of the shoulder straps **21** is coupled to the pack body **10** via the upper resilient strap **311** and the lower resilient strap **312**. It is worth mentioning that the lower resilient straps **312** will pull the back side **11** of the pack body **10** close to the back of the wearer when the backpack is worn to ensure the weight of the pack body **10** to close to the center of mass of the wearer. In addition, the upper and lower resilient straps **311**, **312** will provide the resilient forces at different directions of the pack body **10** for not only minimizing any up-and-down movement of the backpack but also reducing any sideward swinging movement of the backpack.

As shown in FIG. **3**, in order to secure the resilient straps **311** at the pack body **10**, the suspension arrangement **30** further comprises two extension tongues **32** extended from the back side **11** of the pack body **10**, wherein the resilient straps **311** are extended between the upper ends of the shoulder straps **21** and the extension tongues **32** respectively. Preferably, the extension tongues **32** are permanently and securely affixed to the back side **11** of the pack body **10** at a top edge thereof by stitching. It is worth mentioning that the two extension tongues **32** ensure the direction of force to be transferred. In particular, the two extension tongues **32** ensure the loading force at the pack body **10** to be transferred along the resilient straps **311**.

As shown in FIG. **3**, each of the resilient straps **311** has a rectangular shape that a width of an upper edge is the same as a width a lower edge, wherein the upper edge of the resilient strap **311** is extended from the extension tongue **32** and the lower edge of the resilient strap **311** is extended from the upper end of the shoulder strap **21**. This uniform width

of the resilient strap **31** will ensure the loading force to be transferred to the shoulder strap **21**. In addition, the resilient force at the upper edge of the resilient strap **311** is the same as the resilient force at lower edge of the resilient strap **311** to ensure the uniform resilient force thereat to support the pack body **10**. Preferably, the upper edge of the resilient strap **311** is permanently affixed to the extension tongue **32** by stitching and the lower edge of the resilient strap **311** is permanently affixed to the upper end of the shoulder strap **21** by stitching.

In addition, the suspension arrangement **30** further comprises two receiving sleeves **33** extended from the pack body to the upper ends of the shoulder straps **21** to receive the resilient straps **311** within the receiving sleeves **33** respectively in a hidden manner, as shown in FIG. **3**. Each of the receiving sleeves **33** has a tubular shape to receive the resilient strap **311**. Accordingly, the upper ends of the shoulder straps **21** are also received in the receiving sleeves **33** in a hidden manner. It is worth mentioning that the upper edges of the receiving sleeves **33** are affixed to secure the receiving sleeves **33** and the lower edges of the receiving sleeves **33** are non-stitched, such that the upper ends of the shoulder straps **21** can be freely slid within the receiving sleeves **33** respectively to allow the resilient straps **311** to be stretched correspondingly.

In particular, a length of each of the receiving sleeves **33** is long enough to cover the maximum length of the resilient strap **311** that the resilient strap **311** is stretched in a maximum condition between the upper edge and the lower edge. Therefore, when the backpack is worn by the wearer, the two resilient straps **311** are hidden and cannot be seen. Preferably, the two receiving sleeves **33** are extended from the extension tongues **33**, preferably affix to the extension tongues **33**, to the upper ends of the shoulder straps **21** to receive the resilient straps **311** within the receiving sleeves **33** respectively in a hidden manner.

According to the preferred embodiment, the tension of the resilient unit **31** should be increased for carrying a heavier load at the backpack or decreased for carrying a lighter load at the backpack. FIG. **4** illustrates a first alternative mode of the suspension arrangement **30**A to allow the user to adjust the tension of the resilient unit **31**A. As shown in FIG. **4**, the resilient straps **311**A is detachably affixed to the pack body **10**, such that the user is able to change different resilient straps **311**A with different tensions corresponding to the load of the backpack.

Accordingly, the suspension arrangement **30**A further comprises two first strap fasteners **351**A extended from the back pack **10** and two second strap fasteners **352**A provided at the resilient straps **311**A respectively, wherein the first strap fasteners **351** are detachably coupled with the second strap fasteners **352**A to detachably couple the resilient straps **311**A at the pack body **10**. It is worth mentioning that the upper edge of the resilient strap **311**A is coupled to the second strap fastener **352**A and the lower edge of the resilient strap **311**A is extended from the upper end of the shoulder strap **21**. Preferably, the first strap fasteners **351** are coupled at the extension tongues **32**A respectively. Preferably, the first and second strap fasteners **351**A, **352**A are quick release buckle clip mechanism. It is appreciated the first and second strap fasteners **351**A, **352**A can be other fastening mechanisms such as snap hooks for detachably affixing the resilient straps **311**A to the pack body **10**. It is worth mentioning that the receiving sleeves **33** can be incorporated with this detachably affixing structure to cover the first and second strap fasteners **351**A, **352**A.

FIG. **5** illustrates a second alternative mode the suspension arrangement **30**B to allow the user to adjust the tension of the resilient unit **31**B via a tension adjusting unit **35**B. In particular, the user is able to adjust selectively adjust the tension of each of said resilient straps **311**B via the tension adjusting unit **35**B. As shown in FIG. **5**, the tension adjusting unit **35**B comprises a first adjusting fastener **351**B provided at the pack body **10**, a second adjusting fastener **352**B provided at each of the shoulder straps **21**, and a tension adjustor **353**B detachably fastening the first and second adjusting fasteners **351**B, **352**B to selectively adjust the tension of the respective resilient strap **311**B. Preferably, two first adjusting fasteners **351**B are provided at the extension tongues **32**B respectively and two second adjusting fastener **352**B are provided at the upper ends of the shoulder straps **21** respectively. Therefore, the tension of each of said resilient straps **311**B can be selectively adjusted via the tension of the tension adjustor **353**B.

Accordingly, when the tension adjustor **353**B is made of non-stretchable material to serve as a non-stretchable member **354**B detachably fastening the first and second adjusting fasteners **351**B, **352**B, the distance between the pack body **10** and the upper end of the shoulder strap **21** is fixed to restrict the respective resilient strap **311**B to be stretched. When the tension adjustor **353**B is made of stretchable material to serve as a stretchable member **355**B detachably fastening the first and second adjusting fasteners **351**B, **352**B, the tension adjustor **353**B has a predetermined tension added on to each of the resilient straps **311**B. Therefore, the overall tension of the resilient strap **311**B and the tension adjustor **353**B will be increased for carrying a heavier load of the pack body **10**. Preferably, the first and second adjusting fasteners **351**B, **352**B are two buttons, wherein two button holes are formed at two end portions of the tension adjustor **353**B to detachably fasten the tension adjustor **353**B with the first and second adjusting fasteners **351**B, **352**B. It is appreciated that different fasteners can be used for detachably fastening the tension adjustor **353**B between the pack body **10** and the shoulder strap **21**. Therefore, depending the load of the pack body **10**, the user is able to change different tension adjustors **353**B to adjust selectively adjust the tension of each of said resilient straps **311**B.

FIG. **6** illustrates a third alternative mode the suspension arrangement **30**C to allow the user to adjust the tension of the resilient unit **31**C via a tension adjusting unit **35**C. As shown in FIG. **6**, each of the shoulder straps **21**C comprises a cushioning sleeve **211**C defining an inner cushioning layer **212**C and an outer cushioning layer **213**C overlapped thereon, wherein a sliding cavity **214**C is formed between said inner and outer cushioning layers **212**C, **213**C and a top opening **215**C formed at the upper end of the shoulder straps **21**C to communicate with the sliding cavity **214**C.

Each of the resilient straps **311**C is extended from the pack body **10** to slidably receive in the cushioning sleeve **211**C. In particular, each of the resilient straps **311**C is securely extended from the extension tongues **32**C at the pack body **10** to slidably receive within the sliding cavity **214**C through the top opening **215**C.

The tension adjusting unit **35**C comprises a plurality of first tension fasteners **351**C spacedly formed at each of the resilient straps **311**C and a second tension fastener **352**C formed at the cushioning sleeve **211**C to selectively fasten with one of the first tension fasteners **351**C so as to selectively adjust the tension of the resilient strap **311**C. Accordingly, the first tension fasteners **351**C are embodied as a plurality of first button holes spacedly formed along the resilient straps **311**C. The second tension fastener **352**C

comprises a fastening button provided at the cushioning sleeve **211**C to selectively fasten with one of the first button holes to detachably affix the resilient strap **311**C at the cushioning sleeve **211**C. Preferably, the second tension fastener **352**C further has a second button hole formed at the outer cushioning layer **213**C, wherein the fastening button is provided at the inner cushioning layer **212**C to align with the second button hole. Therefore, when the resilient strap **311**C is slid within the sliding cavity **214**C to selectively align the second button hole with one of the first button holes, the fastening button is fastened with the first and second button holes to affix the resilient strap **311**C at the cushioning sleeve **211**C. As the longer length of the resilient strap **311**C being exposed out of the cushioning sleeve **21**C, the tension of the resilient strap **311**C will be increased. In other words, the wearer is able to increase the tension of each of the resilient straps **311**C by lengthening the portion of the resilient strap **311**C exposed out of the cushioning sleeve **211**C and is able to reduce the tension of each of the resilient straps **311**C by shortening the portion of the resilient strap **311**C exposed out of the cushioning sleeve **211**C. It is worth mentioning that the receiving sleeves **33** can be incorporated with this detachably affixing structure that the receiving sleeve **33** is extended to cover the top opening **215**C of each of the cushioning sleeve **211**C of the shoulder strap **211**C.

FIG. **7** illustrates a fourth alternative mode the suspension arrangement **30**D to allow the user to adjust the tension of the resilient unit **31**D. Accordingly, the suspension arrangement **30**D further comprises a back supporting member **36**D detachably coupled to the back side **11** of the pack body **10**, wherein the resilient unit **31**D is provided between the back supporting member **36**D and the shoulder straps **21**.

As shown in FIG. **7**, the back supporting member **36**D comprises an elongated attachment member **361**D extended between two upper ends of the resilient straps **311**D in a transverse direction, such that the resilient straps **311**D and the attachment member **361**D form an inverted "U" shaped configuration. Accordingly, when the attachment member **361**D is detachably coupled at the pack body **10**, the upper ends of the resilient straps **311**D are coupled at the back side of the pack body **10**. Preferably, the attachment member **361**D is made of rigid but light weight material.

The pack body **10** further comprises a receiving pocket **12**D formed at the back side **11** of the pack body **10** to receive the back supporting member **36**D. As shown in FIG. **7**, the receiving pocket **12**D is formed at the top edge of the pack body **10**. In particular, the receiving pocket **12**D comprises a pocket leaf **121**D having one affixing edge firmly affixed to the pack body **10** and an opposed detachable edge detachably coupling at the back side **11** of the pack body **10** to overlap the pocket leaf **121**D thereon so as to form a pocket cavity between the pocket leaf **121**D and the back side **11** of the pack body **10**. The width of the pocket leaf **121**D is slightly smaller than a length of the attachment member **361**D, such that the attachment member **361**D can be tightly wrapped within the pocket cavity of the pocket leaf **121**D. It is appreciated that the detachable edge of the pocket leaf **121**D can be detachably coupled at the back side **11** of the pack body **10** via snap buttons, button and button hole attachment, hook and loop fasteners, zippers, or the like. Therefore, the wearer is able to change the resilient unit **31**D by detaching the resilient unit **31**D from the receiving pocket **12**D and by re-attaching the desired resilient unit **31**D with proper tension thereof to the receiving pocket **12**D.

FIG. **8** illustrates another alternative mode the back supporting member **36**E of the suspension arrangement **30**E to allow the user to adjust the tension of the resilient unit **31**E. The back supporting member **36**E comprises a cushioning panel **361**E shaped and sized corresponding to the back side **11** of the pack body **10**, wherein the resilient straps **311**E are extended from the cushioning panel **361**E. In addition, the shoulder straps **21** are also extended from the cushioning panel **361**E to affix with the resilient straps **311**D respectively. As shown in FIG. **8**, the cushioning panel **361**E is detachably coupled at the back side **11** of the pack body **10**. Accordingly, a peripheral edge portion of the cushioning panel **361**E is detachably coupled at a peripheral edge portion of the back side **11** of the pack body **10** via a fastening means. Preferably, the fastening means can be a zipper. Alternatively, the fastening means can be snap buttons, button and button hole attachment, hook and loop fasteners, or the like. Therefore, the wearer is able to change the resilient unit **31**E by detaching the cushioning panel **361**E from the pack body **10** and by re-attaching the cushioning panel **361**E with the desired tension of the resilient unit **31**E to the back side **11** of the pack body **10**.

As shown in FIGS. **9** to **15**, a backpack according to a second embodiment illustrates an alternative mode of the first embodiment, wherein the backpack comprises a pack body **10**F, a carrying system **20**F, and a suspension arrangement **30**F.

The pack body **10**F, which is made of durable and waterproof material, has an elongated shape that a length of the pack body **10**F is larger than a width thereof. The pack body **10**F has a storage cavity **101**F for receiving one or more items as a load of the pack body **10**F, and a top opening **102**F, wherein the pack body **10**F comprises a back panel **11**F, a front panel **12**F, two side panels **13**F and a bottom panel **17**F to define the storage cavity **101**F within the back panel **11**F, the front panel **12**F, the side panels **13**F, and the bottom panel **17**F. Preferably, the bottom panel **17**F is made of EVA (Ethylene Vinyl Acetate) material. Cushioning pads are provided at the back panel **11**F. The pack body **10**F further comprises an opening cover **14**F foldably extended from the rear panel **11**F of the pack body **10**F to the front panel **12**F thereof for covering the top opening **102**F and enclosing the storage cavity **101**F. Therefore, the opening cover **14**F can be upwardly flipped to open up the top opening **102**F.

As shown in FIGS. **9**, **18** and **19**, the pack body **10**F further comprises a cover locker **16**F releasably coupled the opening cover **14**F at the front panel **12**F. Accordingly, the cover locker **16**F comprises a first locker member **161**F provided at a front edge of the opening cover **14**F and a second locker member **162**F provided at the front panel **12**F to detachably couple with the first locker member **161**F. In particular, the second locker member **162**F is overlapped and engaged with the first locker member **161**F. The first locker member **161**F comprises a first magnetic element **163**F and a U-shaped resilient locker **164**F, wherein the first magnetic element **163**F is located within the U-shaped resilient locker **164**F. The second locker member **162**F comprises a tapered locking head **165**F with a second magnetic element **166**F embedded therein, wherein the tapered locking head **165**F has an enlarged head portion with a slanted circumferential surface, and a narrowed neck portion downwardly extended from the enlarged head portion. When the second magnetic element **166**F is magnetically attracted with the first magnetic element **163**F, the U-shaped resilient locker **164**F is expanded to slide at the tapered locking head **165**F until the U-shaped resilient locker **164**F is engaged with the neck portion of the tapered locking head **165**F. It is worth mentioning that the magnetic attracting force between the first magnetic element **163**F and

the second magnetic element **166**F will force the U-shaped resilient locker **164**F to expand and to slide at the tapered locking head **165**F. Therefore, the second locker member **162**F is overlapped and engaged with the first locker member **161**F. Accordingly, in order to unlock the cover locker **16**F, the second locker member **162**F must be sidewardly slid to disengage with the first locker member **161**F. Since the U-shaped resilient locker **164**F is engaged with the neck portion of the tapered locking head **165**F, the U-shaped resilient locker **164**F cannot be directly pulled to disengage with the tapered locking head **165**F. Therefore, the tapered locking head **165**F must be slid out of an opening of the-shaped resilient locker **164**F in order to disengage the U-shaped resilient locker **164**F with the tapered locking head **165**F. In other words, the direction of unlocking the cover locking **16**F is different from the direction of folding the opening cover **14**F to open up the top opening **102**F. Therefore, the opening cover **14**F will not be accidentally opened by unintentionally unlocking the cover locker **16**F.

The pack body **10**F further comprises an accessing arrangement **15**F for accessing the storage cavity **101**F. The accessing arrangement **15**F comprises a partition wall **151**F provided in the storage cavity **101**F to partition the storage cavity **101**F into a front cavity **103**F and a rear cavity **104**F. Preferably, four edges of the partition wall **151**F are affixed to the back panel **11**F, the front panel **12**F and the side panels **13**F, such that the front cavity **103**F and the rear cavity **104**F are two discrete cavities that no access can be formed therebetween. It is worth mentioning that the top opening **102**F communicate with the front cavity **103**F, wherein when the opening cover **14**F is upwardly flipped, only the front cavity **103**F is opened up. In order to access the rear cavity **104**F, the accessing arrangement **15**F further comprises a side opening **152**F formed on at least one of the side panels **13**F to communicate with the rear cavity **104**F, and a side fastener **153**F provided at the corresponding side panel **13**F at the side opening **152**F to selectively close the side opening **152**F. In one embodiment, the side fastener **153**F is a zipper formed at the edges of the side opening **152**F to open or close the side opening **152**F. Preferably, an upper end of the side opening **152**F is extended close to an upper edge of the side panel **13**F and the lower end of the side opening **152**F is extended close to a lower edge of the side panel **13**F. Therefore, when the side fastener **153** is actuated to open up the side opening **152**F, the wearer is able to fully access the rear cavity **104**F. Accordingly, a portable electronic device, such as laptop or tablet computer, can be stored and protected in the rear cavity **104**F since the rear cavity **104**F cannot access to the front cavity **103**F.

In one embodiment, a volume of the front cavity **103**F is larger than a volume of the rear cavity **104**F. In order to allow the wearer to easily access the bottom of the front cavity **103**F, the accessing arrangement **15**F further comprises an enlarging slit **154**F extended from the top opening **102**F to enlarge an opening area of the front cavity **103**F, and an enlarging fastener **155**F provided at the enlarging slit **154**F. Accordingly, the enlarging slit **154**F is formed at a side edge of the front panel **12**F, wherein when the enlarging fastener **155**F is actuated to open up the enlarging slit **154**F, the opening area of the front cavity **103**F is enlarged by the top opening **102**F and the enlarging slit **154**F. Therefore, the wearer is able to access the bottom of the front cavity **103**F through the enlarged opening area. It is worth mentioning that the wearer is able to access the upper section of the front cavity **103**F through the top opening **102**F when the enlarging slit **154**F is closed. Preferably, the enlarging fastener **155**F is also a zipper.

It is appreciated that the pack body **10**F further has a front pocket **105**F formed behind the front panel **12**F and in front of the front cavity **103**F, wherein the top opening **102**F serves as a common opening for the front pocket **105**F and the front cavity **103**F. In other words, the opening cover **14**F is folded to close the top opening **102**F in order to enclose the front pocket **105**F and the front cavity **103**F at the same time. Likewise, the accessing arrangement **15**F further comprises a front slit **156**F extended from the top opening **102**F to enlarge an opening area of the front pocket **105**F, and a front fastener **157**F provided at the front slit **156**F. Accordingly, the front slit **156**F has a L-shape or U-shape formed at the front panel **12**F, wherein when the front fastener **157**F is actuated to open the front slit **156**F, the front panel **12**F can be frontwardly flipped to open up the front pock **105**F. The front fastener **157**F is also a zipper.

The carrying system **20**F comprises two shoulder straps **21**F extended from the pack body **10**F for allowing the wearer to wear the pack body **10**F at the wearer's back. Preferably, the shoulder straps **21**F are provided at the back panel **11**F of the pack body **10**F. A front detachable pocket **18**F is provided to detachably couple at one of the shoulder straps **21**F.

The suspension arrangement **30**F comprises a resilient unit **31**F provided between the pack body **10**F and the shoulder straps **21**F, wherein the resilient unit **31**F allows a relative movement of the pack body **10**F with respect to each of the shoulder straps **21**F. Accordingly, the resilient unit **31**F provides a predetermined tension between the pack body **10**F and the shoulder straps **21**F, such that the pack body **10**F can be relatively moved with respect to the shoulder straps **21**F.

As shown in FIGS. **10** and **11**, the resilient unit **31**F comprises two resilient straps **311**F extended from upper ends of the shoulder straps **21**F respectively to the pack body **10**F, wherein each of the resilient straps **311**F provides the resilient force to absorb the bounding force of the pack body **10**F to the respective shoulder strap **21**F. In other words, the two resilient straps **311**F provide the independent resilient forces at the shoulder straps **21**F respectively to individually absorb the bounding force of the pack body **10**F.

The suspension arrangement **30**F further comprises two receiving sleeves **33**F extended from the pack body **10**F to the upper ends of the shoulder straps **21**F to receive the resilient straps **311**F within the receiving sleeves **33**F respectively in a hidden manner, as shown in FIGS. **10** and **11**. Each of the receiving sleeves **33**F has a tubular shape to receive the resilient strap **311**F. Accordingly, each of the receiving sleeves **33**F, having a bellow shape, has an upper end coupled to the pack body **10**F and a lower end coupled to the upper end of the shoulder strap **21**F, such that the resilient straps **311**F is received along the receiving sleeve **33**F in a hidden manner. It is worth mentioning that the bellow shaped receiving sleeve **33**F allows the resilient straps **311**F to be stretched correspondingly. In other words, a length of each of the receiving sleeves **33**F is long enough to cover the maximum length of the resilient strap **311**F that the resilient strap **311**F is stretched in a maximum condition between the upper edge and the lower edge. Therefore, when the backpack is worn by the wearer, the two resilient straps **311**F are hidden and cannot be seen.

The resilient unit **31**F further comprises two lower resilient straps **312**F extended from lower ends of the shoulder straps **21**F respectively to the pack body **10**F, wherein the lower resilient straps **312**F will also provide the resilient force to absorb the bounding force of the pack body **10**F to the respective shoulder strap **21**F. The resilient straps **311**F,

312F are made of stretchable material to generate the resilient force. Preferably, the resilient straps **311**F are permanently affixed between the upper ends of the shoulder straps **21**F and the pack body **10**F, and the lower resilient straps **312**F are detachably affixed between the lower ends of the shoulder straps **21**F and the pack body **10**F.

Accordingly, the lower resilient strap **312**F is detachably and slidably coupled to the lower end of the shoulder strap **21**F via a strap slide **210**F. The strap slide **210** can allow the lower end of the shoulder strap **21**F to be detached from the lower resilient strap **312**F so as to detach the lower end of the shoulder strap **21** from the pack body **10**F. The strap slide **210**F is provided at the lower end of each of the shoulder straps **21**F. The strap slide **201**F can also allow a usage length of the lower resilient strap **312**F, i.e. a distance between the pack body **10**F and the lower end of the shoulder strap **21**F, to be selectively adjusted. It is worth mentioning that when the usage length of the lower resilient strap **312**F is decreased, the lower resilient strap **312**F will generate lesser resilient force, and when the usage length of the lower resilient strap **312**F is increased, the lower resilient strap **312**F will generate larger resilient force.

As shown in FIGS. **10** to **14** and **17**, the suspension arrangement **30**F further comprises a strap fastening unit **35**F for detachably coupling each of the lower resilient straps **312**F at the pack body **10**F. The strap fastening unit **35**F comprises two first strap fasteners **351**F extended from the back pack **10**F and two second strap fasteners **352**F provided at the lower ends of the lower resilient straps **312**F respectively, wherein the first strap fasteners **351**F are detachably coupled with the second strap fasteners **352**F to detachably couple the lower resilient straps **312**F at the pack body **10**F.

Each of the first strap fasteners **351**F comprises first and second fastener panels **353**F, **354**F defining a sliding gap **355**F therebetween and an engaging through slot **356**F formed at the first fastener panel **353**F to communicate with the sliding gap **355**F. Each of the second strap fasteners **352**F comprises a sliding panel **357**F slidably inserted into the sliding gap **355**F and a resilient engaging member **358**F flexibly protruded from the sliding panel **357**F to engage with the engaging through slot **356**F when the sliding panel **357**F is slid into the sliding gap **355**F to detachably couple the second strap fastener **352**F with the first strap fastener **351**F. In order to detach the second strap fastener **352**F from the first strap fastener **351**F, the resilient engaging member **358**F is pressed on the sliding panel **357**F to disengage with the engaging through slot **356**F, such that the sliding panel **357**F is slid out of the sliding gap **355**F. It is worth mentioning that the engaging through slot **356**F is a circular through hole and the resilient engaging member **358**F has a circular shape. Therefore, when the resilient engaging member **358**F is engaged with the engaging through slot **356**F, the sliding panel **357**F can be rotated at the sliding gap **355**F to rotatably couple the second strap fastener **352**F with the first strap fastener **351**F. In other words, the strap fastening unit **35**F not only provides a detachable feature for detachably coupling each of the lower resilient straps **312**F at the pack body **10**F but also serves as a rotatable point for rotatably coupling each of the lower resilient straps **312**F at the pack body **10**F.

As a result, the lower resilient straps **312**F is detachably affixed to the pack body **10**F, such that the user is able to change different lower resilient straps **312**F with different tensions corresponding to the load of the backpack.

FIGS. **20**, **22**, and **23** illustrates the loading force applied at the shoulders of the wearer by the present invention and the normal backpack (conventional backpack). Assuming that the acceleration of the wear is about 5.2 mph (mile per hour), the wearer wears the present backpack and the normal backpack respectively loaded with the same weight (10 lb). When the wearer is stationary, i.e. not moving, the loading force applied at the shoulders of the wearer through the shoulder straps of the present invention is the same as the loading force applied at the shoulders of the wearer through the shoulder straps of the normal backpack.

When the wearer walks or runs, the backpack will moved up and down according to the step movement of the wearer. Assumed that the value of upward acceleration of the backpack is positive and the value of the downward acceleration of the backpack is negative. When the wearer's body moves up during walks or runs, the value of acceleration of the normal backpack is negative from point A to point B to point C, wherein the point B is a bottom peak and has the maximum valve of the upward acceleration of the normal backpack. In other words, the maximum loading force applied at the shoulders of the wearer through the shoulder straps of the normal backpack is defined at the point B according to the upward movement of the wearer. When the wearer's body moves down during walks or runs, the value of acceleration of the normal backpack is positive from point C to point D to point E, wherein the point D is a top peak and has the maximum valve of the downward acceleration of the normal backpack. In other words, the maximum loading force applied at the shoulders of the wearer through the shoulder straps of the normal backpack is defined at the point D according to the downward movement of the wearer. Then, the wearer's body will move up again during walks or runs, wherein the value of acceleration of the normal backpack is negative from point E to point F to point G. Therefore, the point F is another bottom peak and has the maximum valve of the upward acceleration of the normal backpack.

Comparing the top peaks and the bottom peaks of the loading forces at the present backpack and the normal backpack, the top peaks of the loading forces for the present backpack are lower than the top peaks of the loading forces for the normal backpack, and the bottom peaks of the loading forces for the present backpack are higher than the bottom peaks of the loading forces for the normal backpack. It means that the loading forces applied to the shoulders of the wearer via the present backpack are smaller than the loading forces applied to the shoulders of the wearer via the normal backpack. In addition, the amplitudes of the loading forces of the present backpack is smaller than the amplitudes of the loading forces of the normal backpack, such that the present backpack can be stably worn by the wearer comparing with the normal backpack by minimizing the up-and-down movement of the backpack.

Furthermore, FIG. **20** also illustrates the loading time for the downward loading force applied on the shoulders of the wearer, wherein the pressure on the shoulders of the wearer will be increased via the downward loading force when the loading time is prolonged, and the pressure on the shoulders of the wearer will be reduced via the downward loading force when the loading time is shortened.

An acceleration sensor is utilized for determining the acceleration of the backpack for a time interval of 1/50 second. The loading time for the loading force applied on the shoulders of the wearer via the normal backpack is 0.08 second. The loading time for the loading force applied on the shoulders of the wearer via the present backpack is 0.12 second. Therefore, the present invention provides a better buffering than the normal backpack.

FIG. **21** is a table illustrating the maximum pressure applied to the shoulders of the wearer with respect to the acceleration thereof. For example, a miniature force sensor is placed in each of the present backpack and the normal backpack for determining the maximum pressures thereat, wherein the present backpack and the normal backpack are respectively loaded with the same weight (10 lb), as shown in FIGS. **22** and **23**. Comparing the acceleration values from 3 mph to 8 mph, the maximum pressures applied to the shoulders of the wearer by the present backpack are smaller than the maximum pressures applied to the shoulders of the wearer by the normal backpack. Therefore, from FIGS. **20** to **23**, the loading force applied at the shoulders of the wearer through the shoulder straps of the present invention is smaller than the loading force applied at the shoulders of the wearer through the shoulder straps of the normal backpack, so as to minimize a continuous bounding movement/force of the backpack to the wearer's body when the wearers walks or runs.

Accordingly, all the features in the above preferred embodiment and its alternatives are interchangeable to achieve the objective of the present invention. In particular, the two resilient straps are made of elastic fabric to provide a predetermined tension to absorb the bounding force of the load at the backpack. The tension of each resilient strap will be self-adjusted corresponding to the load at the backpack to ensure the loading force to be evenly distributed at the shoulder straps. Therefore, the present invention provides a simple but effective configuration for minimizing any continuous bounding movement/force of the backpack to the wearer's body when the wearers walks or runs so as to prevent the cause of the back fatigue and strain for the wearer.

One skilled in the art will understand that the embodiment of the present invention as shown in the drawings and described above is exemplary only and not intended to be limiting.

It will thus be seen that the objects of the present invention have been fully and effectively accomplished. The embodiments have been shown and described for the purposes of illustrating the functional and structural principles of the present invention and is subject to change without departure from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.

What is claimed is:

1. A backpack, comprising:

a pack body;

a carrying system which comprises two shoulder straps extended from said pack body; and

a suspension arrangement which comprises two receiving sleeves and a resilient unit provided between said pack body and said shoulder straps for absorbing a bounding force of said pack body to minimize a relative movement of said pack body with respect to each of said shoulder straps, wherein said resilient unit comprises two upper resilient straps extended from upper ends of said shoulder straps respectively to said pack body and two lower resilient straps extended from lower ends of said shoulder straps respectively to said pack body, such that each of said upper and lower resilient straps provides a resilient force to absorb said bounding force of said pack body to said respective shoulder strap, wherein said receiving sleeves are extended from said pack body to said upper ends of said shoulder straps to receive said upper resilient straps within said receiving sleeves respectively in a hidden manner.

2. The backpack, as recited in claim **1**, wherein each of said receiving sleeves, which is formed in a bellow shape, has an upper end coupled to said pack body and a lower end coupled to said upper end of said shoulder strap.

3. The backpack, as recited in claim **1**, wherein said lower resilient straps are detachably coupled between said lower ends of said shoulder straps and said pack body.

4. The backpack, as recited in claim **2**, wherein said lower resilient straps are detachably coupled between said lower ends of said shoulder straps and said pack body.

5. The backpack, as recited in claim **3**, wherein said carrying system further comprises two strap slides provided at said lower ends of said shoulder straps to couple with said lower resilient straps respectively, such that each of said strap slides allows said lower end of said shoulder strap to be detached from said lower resilient strap and allows a usage length of said lower resilient strap to be selectively adjusted.

6. The backpack, as recited in claim **4**, wherein said carrying system further comprises two strap slides provided at said lower ends of said shoulder straps to couple with said lower resilient straps respectively, such that each of said strap slides allows said lower end of said shoulder strap to be detached from said lower resilient strap and allows a usage length of said lower resilient strap to be selectively adjusted.

7. The backpack, as recited in claim **5**, wherein said suspension arrangement further comprises a strap fastening unit for detachably coupling each of said lower resilient straps at said pack body, wherein said strap fastening unit comprises two first strap fasteners extended from said back pack and two second strap fasteners provided at lower ends of said lower resilient straps respectively, wherein said first strap fasteners are detachably and rotatably coupled with said second strap fasteners to detachably couple said lower resilient straps at said pack body.

8. The backpack, as recited in claim **6**, wherein said suspension arrangement further comprises a strap fastening unit for detachably coupling each of said lower resilient straps at said pack body, wherein said strap fastening unit comprises two first strap fasteners extended from said back pack and two second strap fasteners provided at lower ends of said lower resilient straps respectively, wherein said first strap fasteners are detachably and rotatably coupled with said second strap fasteners to detachably couple said lower resilient straps at said pack body.

9. The backpack, as recited in claim **7**, wherein each of said first strap fasteners comprises first and second fastener panels defining a sliding gap therebetween and an engaging through slot formed at said first fastener panel to communicate with said sliding gap, wherein each of said second strap fasteners comprises a sliding panel slidably inserted into said sliding gap and a resilient engaging member flexibly protruded from said sliding panel to engage with said engaging through slot when said sliding panel is slid into said sliding gap to detachably couple said second strap fastener with said first strap fastener, such that said first strap fastener is detachably and rotatably coupled with said second strap fastener.

10. The backpack, as recited in claim **8**, wherein each of said first strap fasteners comprises first and second fastener panels defining a sliding gap therebetween and an engaging through slot formed at said first fastener panel to communicate with said sliding gap, wherein each of said second strap fasteners comprises a sliding panel slidably inserted into said sliding gap and a resilient engaging member flexibly protruded from said sliding panel to engage with

said engaging through slot when said sliding panel is slid into said sliding gap to detachably couple said second strap fastener with said first strap fastener, such that said first strap fastener is detachably and rotatably coupled with said second strap fastener.

11. The backpack, as recited in claim **1**, wherein said pack body has a storage cavity, a top opening, an enlarging slit extended from said top opening to enlarge an opening area of said storage cavity, and an enlarging fastener provided at said enlarging slit.

12. The backpack, as recited in claim **4**, wherein said pack body has a storage cavity, a top opening, an enlarging slit extended from said top opening to enlarge an opening area of said storage cavity, and an enlarging fastener provided at said enlarging slit.

13. The backpack, as recited in claim **11**, wherein said pack body further comprises a partition wall provided in said storage cavity to partition said storage cavity into a front cavity and a rear cavity as two discrete cavities that said top opening only communicates with said front cavity, wherein said an enlarging slit extended from said top opening to enlarge an opening area of said front cavity.

14. The backpack, as recited in claim **12**, wherein said pack body further comprises a partition wall provided in said storage cavity to partition said storage cavity into a front cavity and a rear cavity as two discrete cavities that said top opening only communicates with said front cavity, wherein said an enlarging slit extended from said top opening to enlarge an opening area of said front cavity.

15. The backpack, as recited in claim **13**, wherein said pack body comprises a back panel, a front panel, two side panels, a bottom panel, an opening cover foldably extended from said rear panel to said front panel for covering said top opening, and a cover locker releasably coupled said opening cover at said front panel, wherein said cover to locker comprises a first locker member provided at a front edge of said opening cover and a second locker member provided at said front panel, wherein said second locker member is sidewardly and slidably engaged with said first locker member.

16. The backpack, as recited in claim **14**, wherein said pack body comprises a back panel, a front panel, two side panels, a bottom panel, an opening cover foldably extended from said rear panel to said front panel for covering said top opening, and a cover locker releasably coupled said opening cover at said front panel, wherein said cover locker comprises a first locker member provided at a front edge of said opening cover and a second locker member provided at said front panel, wherein said second locker member is sidewardly and slidably engaged with said first locker member.

17. The backpack, as recited in claim **15**, wherein said pack body further has a side opening formed on at least one of said side panels to communicate with said rear cavity, and a side fastener provided at the corresponding side panel at said side opening to selectively close said side opening.

18. The backpack, as recited in claim **16**, wherein said pack body further has a side opening formed on at least one of said side panels to communicate with said rear cavity, and a side fastener provided at the corresponding side panel at said side opening to selectively close said side opening.

19. The backpack, as recited in claim **15**, wherein said first locker member comprises a U-shaped resilient locker and a first magnetic element located within said U-shaped resilient locker, wherein said second locker member comprises a tapered locking head and a second magnetic element embedded therein, wherein said tapered locking head has an enlarged head portion with a slanted circumferential surface, and a narrowed neck portion downwardly extended from said enlarged head portion, such that when said second magnetic element is magnetically attracted with said first magnetic element, said U-shaped resilient locker is expanded to slide at said tapered locking head until said U-shaped resilient locker is engaged with said neck portion of said tapered locking head.

20. The backpack, as recited in claim **16**, wherein said first locker member comprises a U-shaped resilient locker and a first magnetic element located within said U-shaped resilient locker, wherein said second locker member comprises a tapered locking head and a second magnetic element embedded therein, wherein said tapered locking head has an enlarged head portion with a slanted circumferential surface, and a narrowed neck portion downwardly extended from said enlarged head portion, such that when said second magnetic element is magnetically attracted with said first magnetic element, said U-shaped resilient locker is expanded to slide at said tapered locking head until said U-shaped resilient locker is engaged with said neck portion of said tapered locking head.

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