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(54) **MODULAR HIP BELT WITH GROSS AND FINE ADJUSTMENT**

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A45F 3/12	(2006.01)
A47D 13/02	(2006.01)

(52) **U.S. Cl.**
CPC ***A45F 3/047*** (2013.01); ***A45F 3/12*** (2013.01); ***A47D 13/02*** (2013.01); *A45F 2003/045* (2013.01); *A45F 2003/127* (2013.01)

(58) **Field of Classification Search**
CPC A61F 5/028; A61F 5/03; A61F 2250/001; Y10T 24/342
See application file for complete search history.

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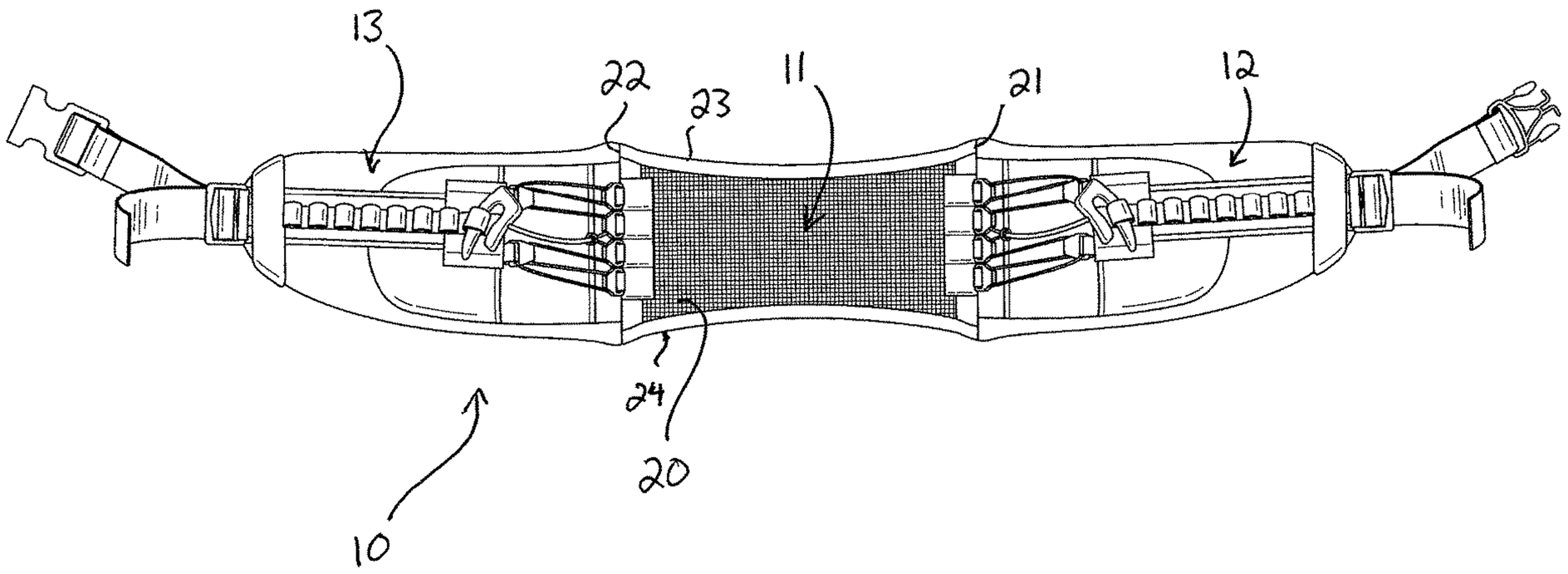
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(57) **ABSTRACT**

A hip belt includes a center panel, and first and second padded portions connected to the center panel and extending therefrom. Each of the first and second padded portions includes a rear end, an opposed front end, and a face extending therebetween. A pulley assembly is carried on the padded portion, and the pulley assembly includes proximal pulleys located at the rear end, distal pulleys located between the front and rear ends, and a cord wound therebetween. A collapsible panel between the proximal and distal pulleys collapses when the pulley assembly contracts. A buckle is carried at a front end of the respective first of second padded portion.

20 Claims, 9 Drawing Sheets



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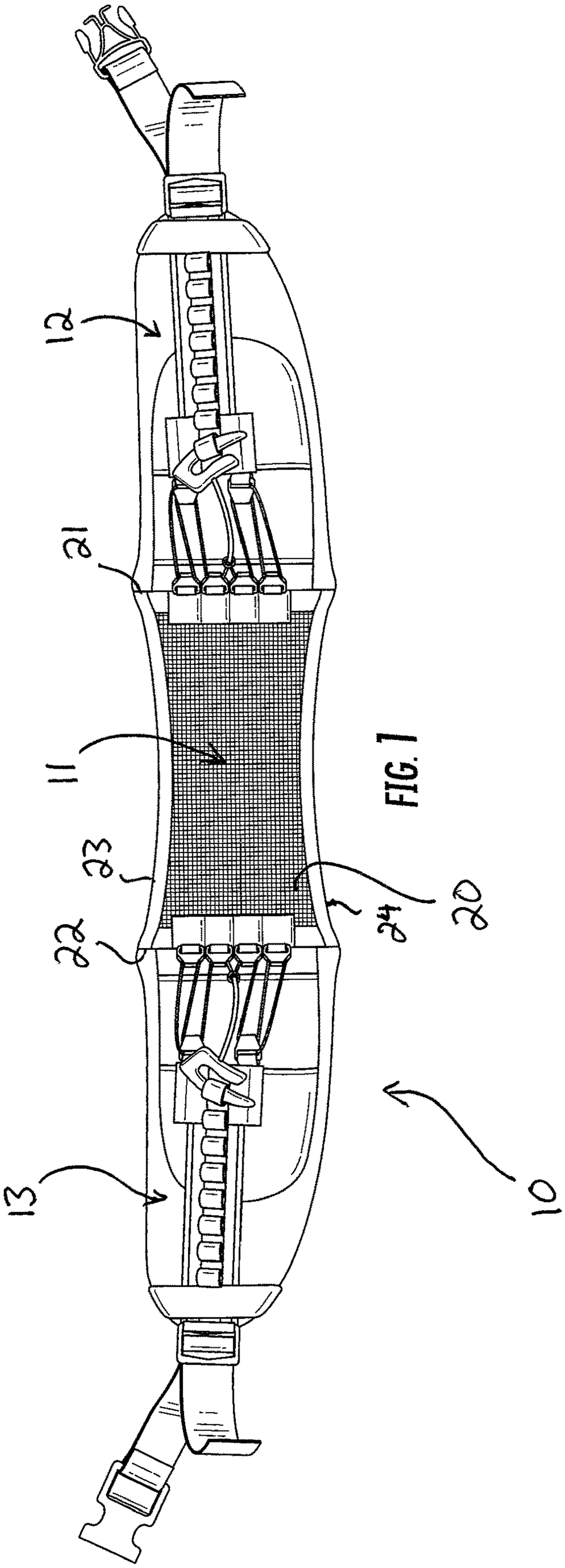


FIG. 1

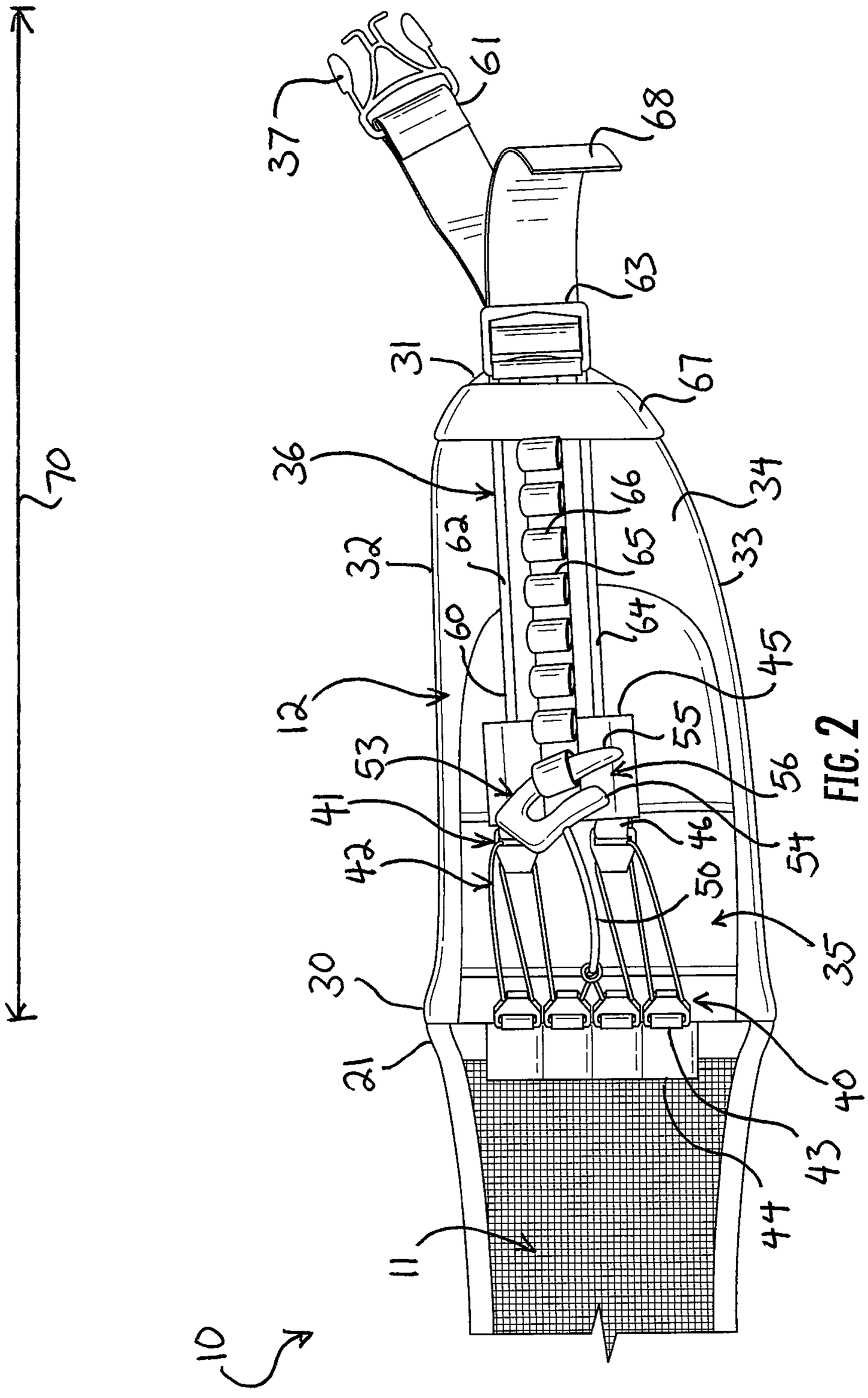

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FIG. 2

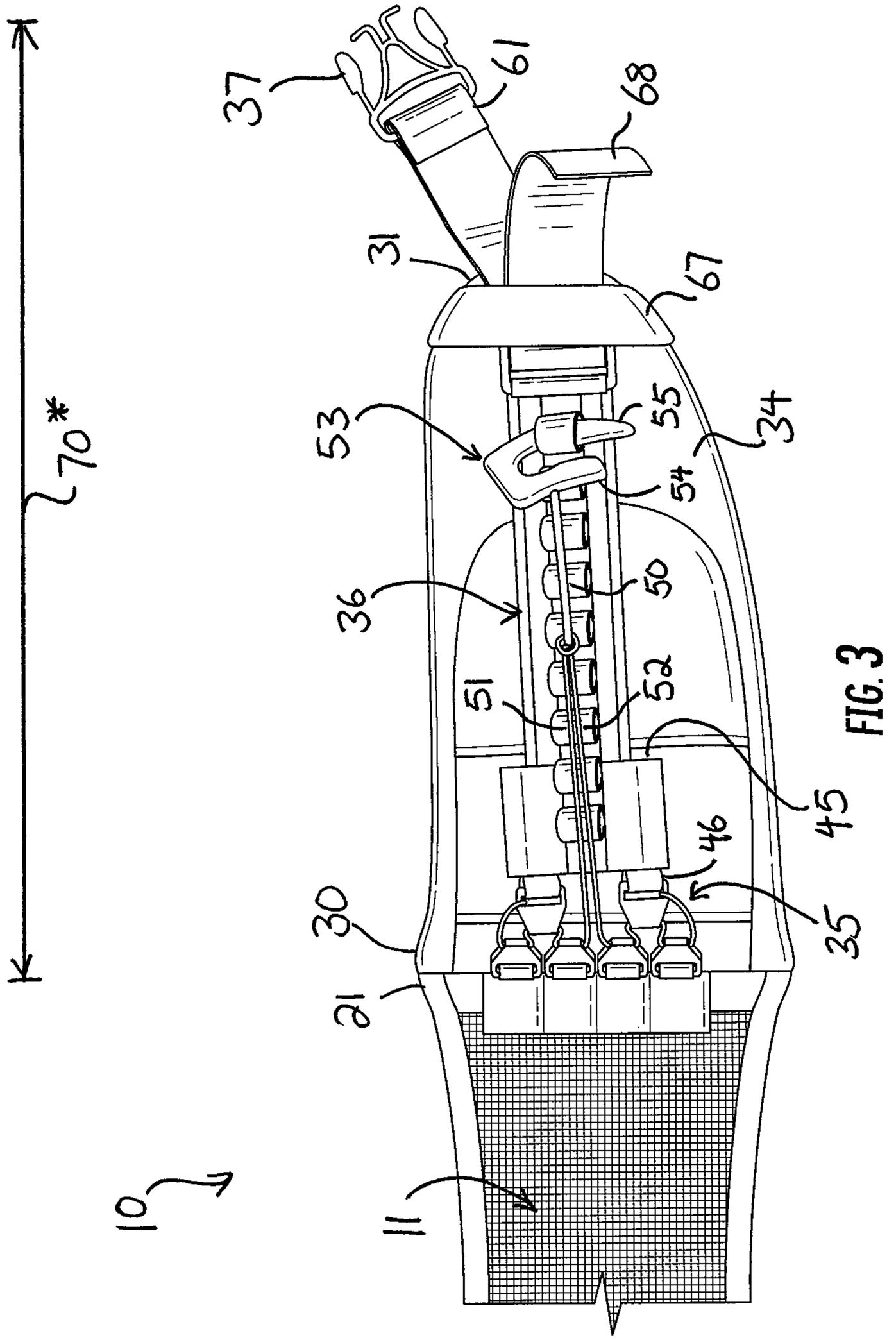


FIG. 3

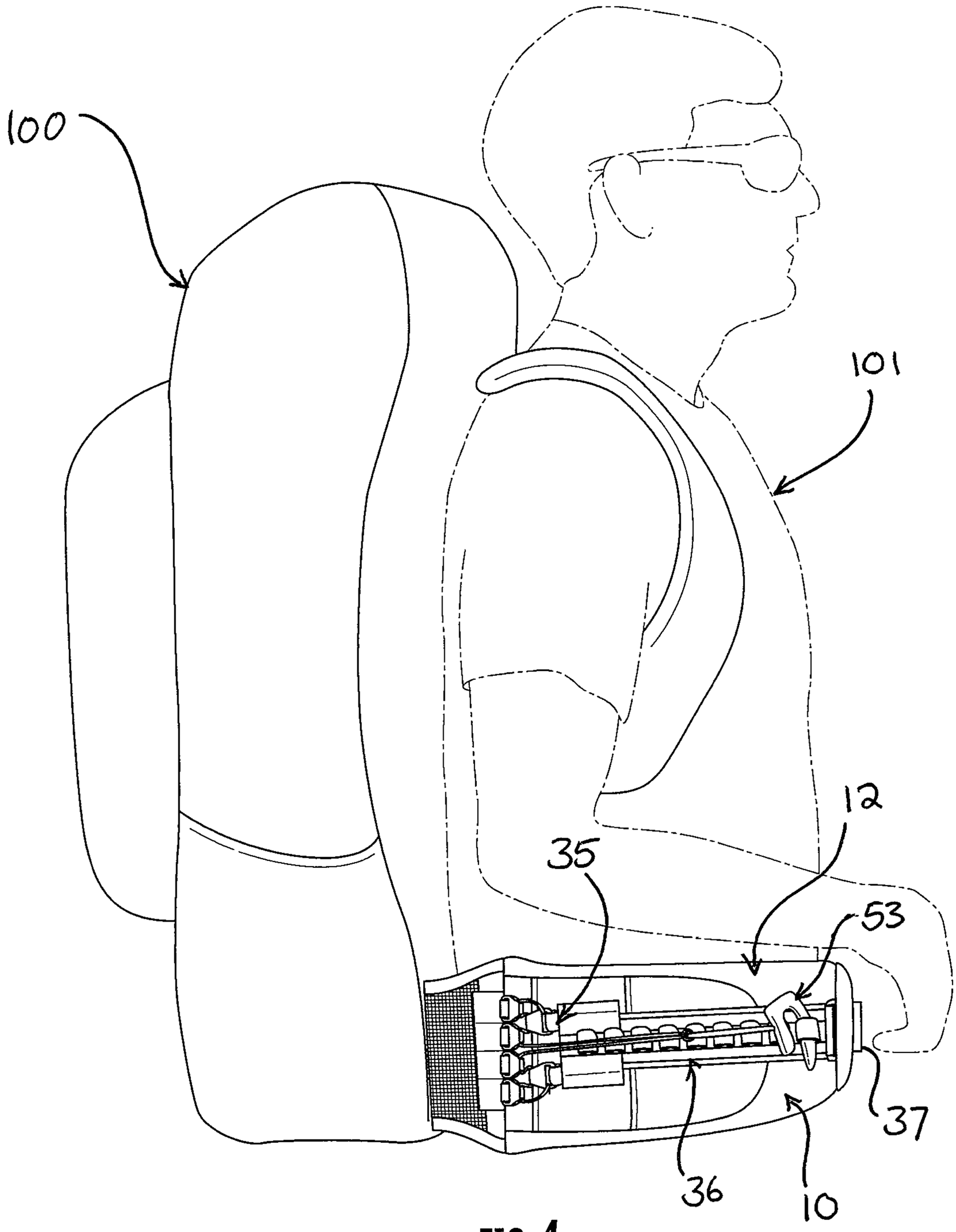


FIG. 4

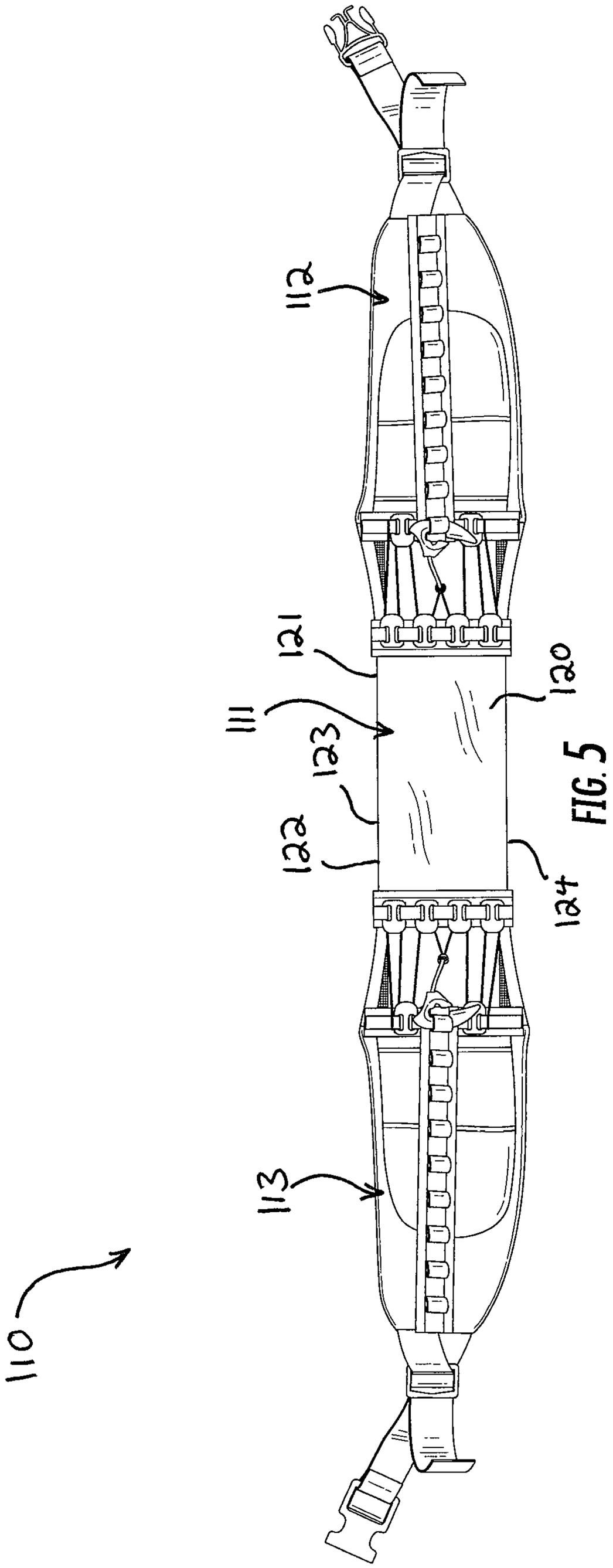


FIG. 5

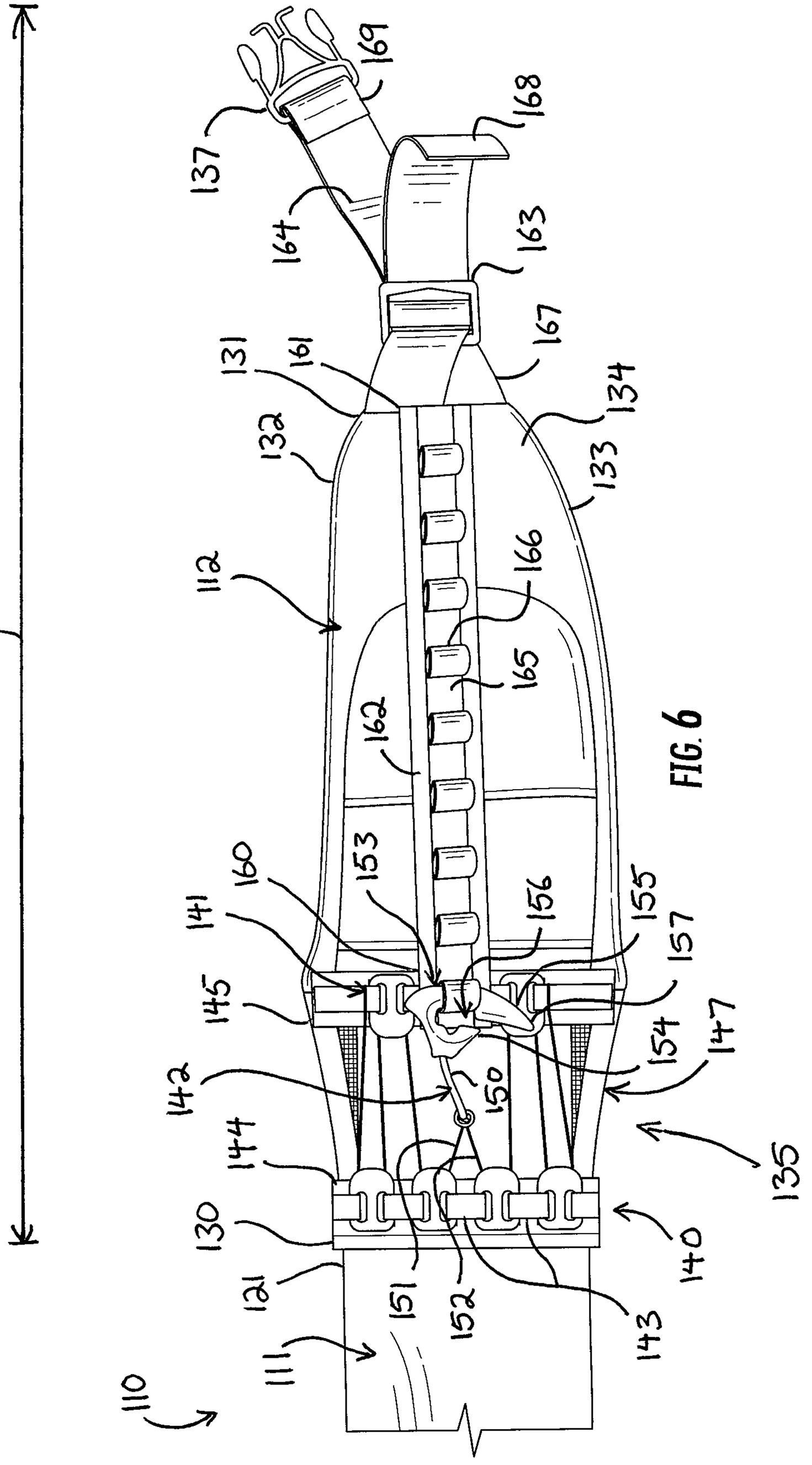

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FIG. 6

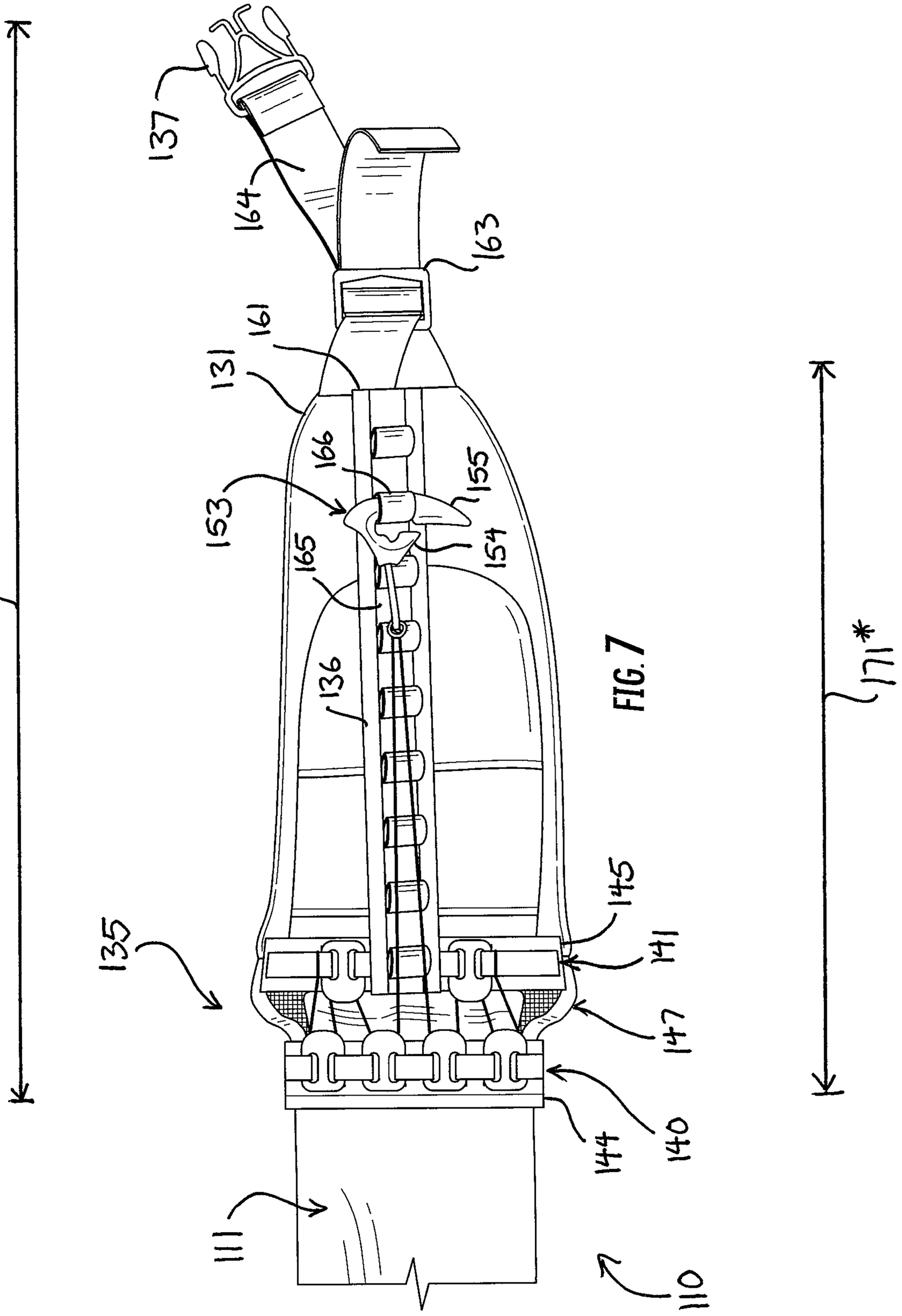

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FIG. 7

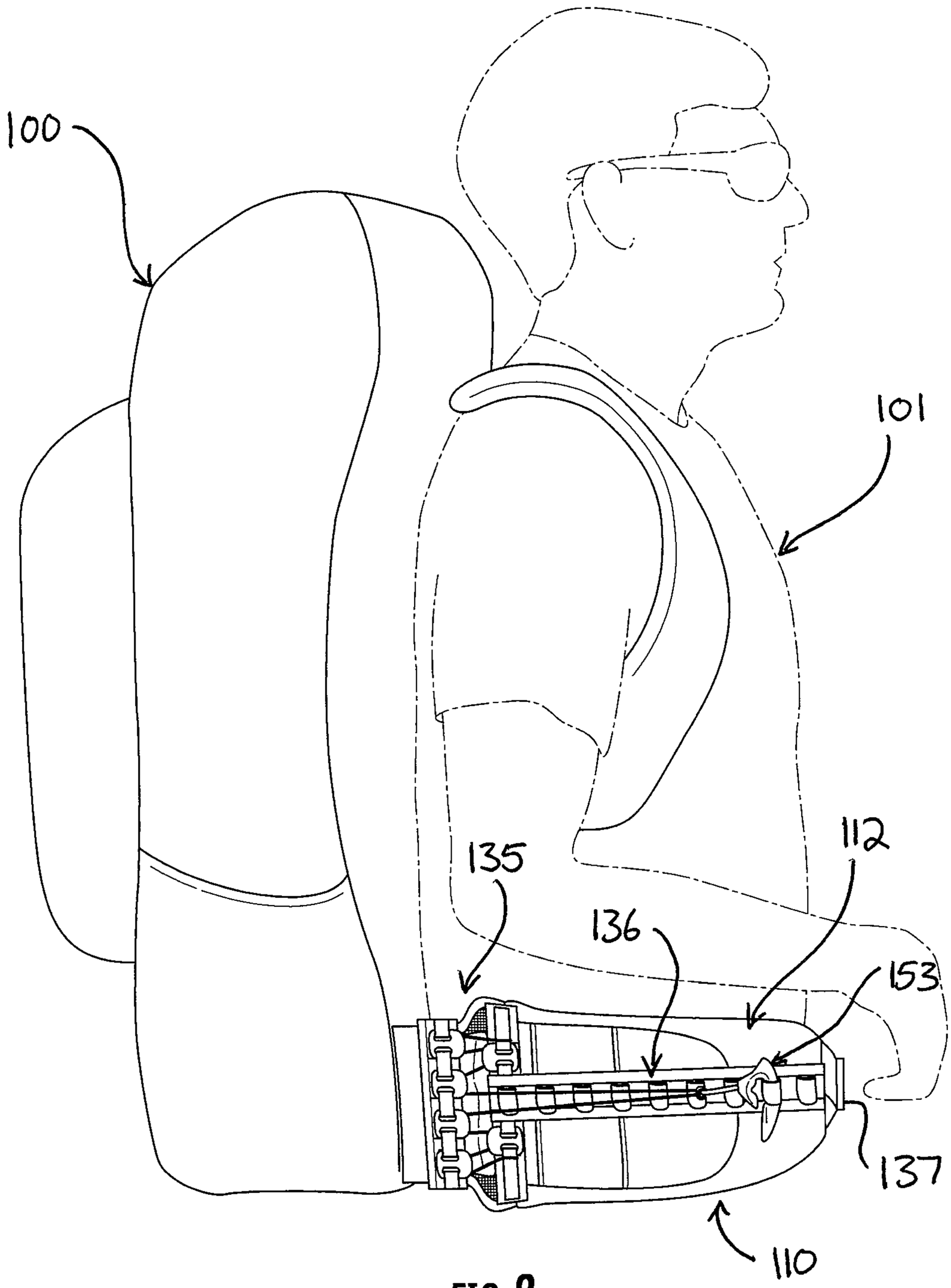


FIG. 8

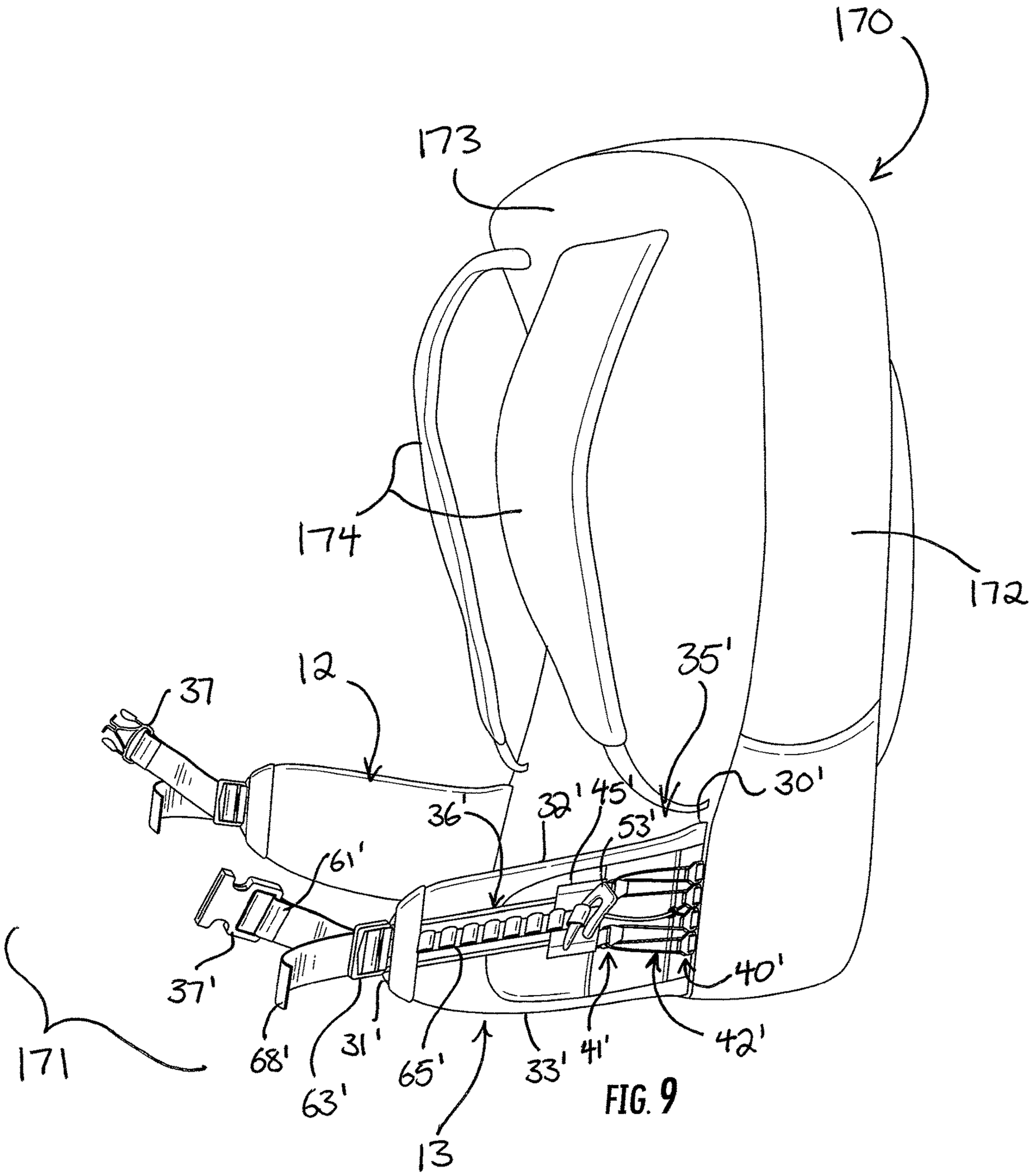

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12
37
35'
30'
36'
32'
45'
53'
61'
37'
40'
171
68'
31'
65'
33'
41'
42'
63'
13

FIG. 9

MODULAR HIP BELT WITH GROSS AND FINE ADJUSTMENT

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of and claims the benefit of prior U.S. patent application Ser. No. 16/286,409, filed Feb. 26, 2019, which is hereby incorporated by reference.

FIELD OF THE INVENTION

The present invention relates generally to support apparatus, and more particularly to hip belts for use with backpacks, child carriers, and the like.

BACKGROUND OF THE INVENTION

Hiking backpacks and baby- and child-carrier backpacks typically have shoulder straps and hip belts for supporting the weight of the pack contents. The shoulder straps carry much of the weight and provide lateral and sagittal support. The hip belt, however, is intended to support most of the weight of the pack. Hip belts are meant to be used such that the weight of the pack does not rest on the spine but rather on the pelvis, thereby transferring weight through the hips and legs, which are relatively more stable and supportive then the spine.

Hip belts often are not used, however. Some people forego their use entirely, allowing the full weight of a camping weekend to rest on their back. Others might loosely secure the hip belt around their waist to prevent the pack from tilting and moving around on their shoulders. Some may over-tighten, squeezing their belts or midsections. The misuse of the hip belt is a result of both miseducation and poor design. Most people are not aware of how to properly fit a hip belt. The belt should sit at the top of your hips, snugly hugging the iliac crest, so that the weight is comfortably carried by the pelvis.

This education issue is compounded by generally poor design in hip belts. Most belts employ a conventional buckle-based tightening system: two straps extend around two padded portions and are then coupled to each other with complemental buckles. The straps are tightened with a gross adjustment mechanism when the user pulls on free ends of the strap. The user can loosen the belt by lifting the buckles or pulling the strap the other way.

This design tends to force users to make only gross adjustments. Because the strap becomes more difficult to pull as the belt grows tighter, the user must apply more force on the strap, increasing the likelihood that when the strap actually does move, it will move significantly. It can thus be difficult to finely adjust a belt to the proper fit. An improved mechanism for adjusting not just backpack belts, but child-carrying pack belts and other types of belts, is needed.

SUMMARY OF THE INVENTION

A hip belt includes an inelastic center panel and first and second padded portions connected to the center panel and extending therefrom. Each of the first and second padded portions has a rear end proximate to the center panel, an opposed front end, and a face extending therebetween. Each also has an adjustable pulley assembly carried on the padded portion, and a strap secured to the pulley assembly over the padded portion for sliding movement along the face of the padded portion. A buckle is carried at the front end of each padded portion.

The above provides the reader with a very brief summary of some embodiments described below. Simplifications and omissions are made, and the summary is not intended to limit or define in any way the scope of the invention or key aspects thereof. Rather, this brief summary merely introduces the reader to some aspects of some embodiments in preparation for the detailed description that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the drawings:

FIG. **1** is an elevation view of a modular hip belt with gross and fine adjustments, showing both left and right sides or padded portions of the hip belt;

FIGS. **2** and **3** are elevation views of the right side of the hip belt of FIG. **1**, showing loosened and tightened conditions, respectively;

FIG. **4** illustrates the hip belt of FIG. **1** worn by a user in the tightened condition;

FIG. **5** is an elevation view of a modular hip belt with gross and fine adjustment, showing both left and right sides of the hip belt;

FIGS. **6** and **7** are elevation views of the right side of the hip belt of FIG. **5**, showing loosened and tightened conditions, respectively;

FIG. **8** illustrates the hip belt of FIG. **5** worn by a user in the tightened condition; and

FIG. **9** is a perspective view of a backpack with an integrated hip belt.

DETAILED DESCRIPTION

Reference now is made to the drawings, in which the same reference characters are used throughout the different figures to designate the same elements. FIG. **1** illustrates a modular hip belt with boss gross and fine adjustment mechanisms (hereinafter, "hip belt **10**"). The hip belt **10** includes a center panel **11** and first and second padded portions **12** and **13** connected to the center panel **11** and extending therefrom. For convenience and clarity, the first and second padded portions **12** and **13** will generally be referred to hereinafter as "right" and "left" padded portions **12** and **13** to correspond not only with their layout in the drawings but also with their intended orientation when the hip belt **10** is worn by a user.

The center panel **11** is preferably a flexible yet inelastic support between the right and left padded portions **12** and **13**. It provides a base supporting the padded portions **12** and **13** and allows the hip belt **10** to, through a variety of means, be attached onto or integrated into a hiking backpack, child-carrying backpack, or other back support apparatus. The center panel **11** has an inner face, an outer face **20**, opposed right and left sides **21** and **22**, and a top **23** and bottom **24**. The top **23** and bottom **24** are curved inwardly. The center panel **11** is constructed from a mesh panel and is reinforced at the sides **21** and **22** and at the top and bottom **24** with nylon hemming or webbing. This reinforcement assists in preventing the center panel **11** from stretching elastically.

The right and left padded portions **12** and **13** are affixed to the right and left sides **21** and **22** of the center panel **11**, respectively. The right and left padded portions **12** and **13** are mirror identical, and so the following description of the right padded portion **12** applies equally to the left padded

portion **13**. As such, there will not be a detailed description of the left padded portion **13**; one having ordinary skill in the art will readily understand how the description of the right padded portion **12** applies to the left padded portion **13**. Further, the reference characters used to identify the various structural elements and features of the right padded portion **12** may also used to identify the same structural elements and features of the left padded portion **13**. However, those of the left padded portion **13** may be marked with a prime ("'") symbol so as to distinguish them from those of the right padded portion **12**.

FIGS. **2** and **3** illustrate the right padded portion **12** in detail and show it in a first, loosened condition (FIG. **2**) and a second, tightened condition (FIG. **3**). The right padded portion **12** is a somewhat rigid and inflexible padded belt portion for placement over a user's hips when carrying a load. The right padded portion **12** is preferably constructed with a somewhat rigid plastic, metal, carbon fiber, or like insert, and a padded underlayer that is directed inward toward the user. The right padded portion **12** has a rear end **30** and an opposed front end **31**. The rear end **30** is proximate to and fixed, such as by stitching, sonic welding, or other method, to the right side **21** of the center panel **11**; when the hip belt **10** is worn, the rear end **30** is proximate the user's back and the front end **31** is proximate the user's front. The right padded portion **12** additionally has a top **32**, a bottom **33**, and an outer face **34** extending across the right padded portion **12** entirely between the top **32** and bottom **33** and between the rear and front ends **30** and **31**. Across the outer face **34**, the right padded portion further carries an adjustable pulley assembly **35** and a strap **36** to which a buckle **37** is attached.

The pulley assembly **35** includes a plurality of base or proximal pulleys **40**, another plurality of distal pulleys **41**, and a cord **42** threaded between the pulleys **40** and **41**. The proximal pulleys **40** are secured to the outer face **34** of the right padded portion **12** at the rear end **30** thereof. Each of the proximal pulleys **40** has a short webbing lead **43** extending laterally (along the length of the right padded portion **12**) toward the center panel **11**. Each of the proximal pulleys **40** is arranged proximate the other in a stacked fashion, so that the webbing leads **43** all extend laterally in a parallel fashion, one above the other. The webbing leads **43** are then affixed to the outer face **34** with a length of webbing **43** sewn down onto the reinforced right side **21** of the center panel **11** across each of the webbing leads **43**, closely to the proximal pulleys **40**. This holds the webbing leads **43** in place, and also restricts any slack in the webbing leads **43** so that the proximal pulleys **40** maintain the lateral orientation toward the front end **31**, as shown in FIGS. **2** and **3**.

The distal pulleys **41** are fixed to a yoke panel **45**. The yoke panel **45** is a piece of inelastic material, thin and small in size, having opposed sides. The distal pulleys **41** are secured to one side and the strap **36** is secured to the opposed side. The distal pulleys **41** also have webbing leads **46** which extend laterally. Unlike the webbing leads **43**, these webbing leads **46** are secured directly to the yoke panel **45** by strong and rugged reinforced stitching. The distal pulleys **41** are oriented laterally toward the proximal pulley **40** such that they are in a confronting arrangement. Preferably, there are half as many distal pulleys **41** as proximal pulleys **40**; in other embodiments, however, different pulley ratios may be advantageous. For example, it may be more preferable to have a 4:3 ratio of proximal pulleys **40** to distal pulleys **41**, or the inverse. Other embodiments may have different vastly different ratios, as desired and needed for the intended use of the hip belt **10**. In the embodiments shown throughout these drawings, there are two distal pulleys **41**; an upper distal pulley **41** and a lower distal pulley **41**. Likewise, there are two upper proximal pulleys **40** and two lower proximal pulleys **40**. The upper distal pulley **41** corresponds to the two upper proximal pulleys **40**, and the lower distal pulley **41** corresponds to the two lower proximal pulleys **40**.

The winding of the cord **42** through the pulley assembly **35** reflects this two-to-one correspondence. The cord **42** includes a major pull cord **50** and two minor pulley cords **51** and **52**. The major pull cord **50** is connected to the two minor pulley cords **51** and **52**, extending from them, proximate the proximal pulleys **40**, to a catch **53**. The minor pulley cord **51** wraps through the lower of the upper proximal pulleys **40**, around through the upper distal pulley **41**, back to the upper of the upper proximal pulleys **40**, and then back to the upper distal pulley **41**, where it is anchored. Similarly, the minor pulley cord **52** wraps through the upper of the lower proximal pulleys **40**, around through the lower distal pulley **41**, back to the lower of the lower proximal pulleys **40**, and the back to the lower distal pulley **41**, where it is anchored.

The catch **53** on the cord **42** has two projecting jaws and **55**, defining a space **56** therebetween. The cord **42** is attached to the jaw **54**, which is short and blunt. Apart from the jaw **54**, the jaw **55** is longer and sharp. The jaw **55** curves slightly back toward the jaw **54**. The jaw **54** is useful to be grasped by a user and the jaw **55** is useful for engaging and securing the catch **53** along the right padded portion **12**.

As described above, the strap **36** is fixed to a side of the yoke panel **45** opposite the distal pulleys **41**. The strap **36** has a rear end **60** and an opposed front end **61**. The terms rear end and front end are specific to the way the strap **36** is arranged on the right padded portion **12** and are distinct from opposed free ends of the strap **36**. Indeed, the strap **36** has a first free end which is fitted with the buckle **37** at the front end **61**, but also has another free end which is clearly visible in FIG. **2** near the front end **61** (hereinafter identified with the reference character **68**). This is because the strap **36** is doubled or folded over itself, so that both free ends are located near the front end **61**. However, as the strap **36** is arranged, the rear end **60** of the strap **36** is secured to the yoke panel **45** by strong and rugged reinforced stitching. The strap **36** has an inner face (not shown) and an outer face **62**. The inner face is directed against the outer face **34** of the right padded portion **12**, and the outer face **62** is directed away from it. The outer face **62**, between the yoke panel **45** and an adjuster buckle **63**, carries a second webbing layer **64**, and on top of that, a strip of molle **65**. The strip of molle **65** is a strip of spaced-apart nylon loops **66**. The loops **66** are arranged normal to the length of the right padded portion **12**, so that their openings are directed vertically up and down.

At the front end **31** of the right padded portion **12**, a band **67** of material is sewn to the top **32** and bottom **33** of the right padded portion **12**, thereby forming a loop through which the strap **36** is passed. This band **67** prevents the strap **36** from migrating off of the right padded portion **12**. The adjuster buckle **63** is located on the strap **36** preferably just beyond the band **67** and off board from the right padded portion **12** when the right padded portion **12** is in the loosened condition thereof. From the adjuster buckle **63**, the strap **36** continues to extend forward, to the front end **61** on which the buckle **37** is secured and to the other free end **68** of the strap **36**.

In operation, the hip belt **10** is used with a backpack **100** as illustrated in FIG. **4**. Though shown with a traditional internal-frame backpack **100**, the hip belt **10** is useful with external-frame backpacks, soft-frame backpacks, no-frame backpacks, child-carrying packs, and other packs apparatus

for carrying loads. Indeed, the hip belt **10** can be used simply as a constriction belt, such as for weight-lifting or medical rehabilitation, where tightening and support about the waist is needed.

A user **101** puts on the backpack **100**, slips the arm straps over his shoulders, and locates the right and left padded portions **12** and **13** around his hips. Preferably, the right and left padded portions **12** and **13** are both in the loosened conditions thereof. The user **101** takes up the straps **36** and **36'** by hand and couples the buckles **37** and **37'** into each other. The buckle **37** snappedly buckles into the complemental buckle **37'** on the left padded portion **11**. The user **101** then moves the hip belt **10** to the tightened condition shown in FIG. **3**.

Returning to FIG. **2**, the strap **36** has an effective length **70** to the buckle **37**. This effective length **70** is measured between the rear end of **30** of the right padded portion **12** and the buckle **37**. Once the buckles **37** and **37'** are coupled to each other, adjusting the effective lengths **70** and **70'** loosens or tightens the hip belt **10** on the user. This can be accomplished in either or both of two different manners. In a first manner, a gross adjustment is made. The user **101** takes up the free end **68** of the strap **36** by hand and pulls it away from the adjuster buckle **63**. This causes the free end **68** to move out away from the adjuster buckle **63** and the front end **61** to move in toward the adjuster buckle **63**, thereby shortening the effective length **70**. Large adjustments are made in this fashion to quickly take up loose slack in the hip belt **10**. Once the gross adjustment is made, the second manner of adjusting is undertaken. Similarly, the right padded portion **12** also has a pad length **71** between the rear and front ends **30** and **31**. However, the pad length **71** remains the same despite adjustment of the strap **36**, the buckle **37**, or the pulley assembly **35**.

In the second manner, a fine adjustment is made. After the gross adjustment has been made, the hip belt **10** is fairly well-tightened about the user **101**. However, the fine adjustment allows the user **101** to carefully dial in exactly the desired amount of squeeze on the hip belt **10**. The user grabs the catch **53** by the jaw **54** and pulls it along the molle **65** until the desired tightness about his waist is achieved. When he pulls the catch **53** forward, the minor pulley cords **51** and **52** move in a corresponding fashion and cause the yoke panel **45** to move in the opposite direction, toward the rear end **30** of the right padded portion **12**. This is shown in FIG. **3**, which is an illustration of the tightened condition of the right padded portion **12**. In this condition, the effective length **70** has been reduced, as designated with the reference character **70***. Importantly, the pad length **71** of the right padded portion **12** between the rear end **30** and the front end **31** does not change; it does not expand, collapse, or alter when moving between the loosened and tightened conditions thereof.

The pulley assembly **35** reduces the effect of the pulling on the catch **53**; when the catch **53** is moved forward a distance along the molle **65**, the yoke panel **45** moves backward a lesser distance, so that the user **101** can affect small changes in tightness with large movements and without having to finely control his own movements. A different number of proximal and distal pulleys **40** and **41** would change the mechanical leverage and the reduction factor, and the hip belt **10** is not necessarily limited to the reduction factor of four proximal pulleys **40** and two distal pulleys **41** shown throughout the drawings.

Once the user **101** has found his desired tightness, the user **101** slips the jaw **55** into the proximate loop **66** on the molle **65**. The user **101** fully seats the catch **53** on the loop **66**; once fully seated, the major pull cord **50** pulls on the catch **53** opposite the jaw **55**, and the catch **53** will not yield or inadvertently come loose. The user **101** can, at any time, slightly loosen or tighten the hip belt **10** by removing the catch **53** from the loop **66** and moving it forward or backward by just one or two loops.

FIG. **5** illustrates a modular hip belt with boss gross and fine adjustment mechanisms (hereinafter, "hip belt **110**". The hip belt **110** is similar in ways to the hip belt **10**. The hip belt **110** includes a center panel **111** and first and second padded portions **112** and **113** connected to the center panel **111** and extending therefrom. For convenience and clarity, the first and second padded portions **112** and **113** will generally be referred to hereinafter as "right" and "left" padded portions **112** and **113** to correspond not only with their layout in the drawings but also with their intended orientation when the hip belt **110** is worn by a user.

The center panel **111** is a flexible yet inelastic support between the right and left padded portions **112** and **113**. It provides a base supporting the padded portions **112** and **113** and allows the hip belt **110** to be integrated into a hiking backpack, child-carrying backpack, or other back support apparatus. The center panel **111** has an inner face, an outer face **120**, opposed right and left sides **121** and **122**, and a top **123** and bottom **124**. The top **123** and bottom **124** are curved inwardly. The center panel **111** is constructed from a mesh panel.

The right and left padded portions **112** and **113** are affixed to the right and left sides **121** and **122** of the center panel **111**, respectively. The right and left padded portions **112** and **113** are mirror identical, and so the following description of the right padded portion **112** applies equally to the left padded portion **113**. As such, there will not be a detailed description of the left padded portion **113**; one having ordinary skill in the art will readily understand how the description of the right padded portion **112** applies to the left padded portion **113**. Further, the reference characters used to identify the various structural elements and features of the right padded portion **112** are also used to identify the same structural elements and features of the left padded portion **113**. However, those of the left padded portion **113** are marked with a prime ("'") symbol so as to distinguish them from those of the right padded portion **112**.

FIGS. **6** and **7** illustrate the right padded portion **112** in detail and show it in a first, loosened condition (FIG. **6**) and a second, tightened condition (FIG. **7**). The right padded portion **112** is a somewhat rigid and inflexible padded belt portion for placement over a user's hips when carrying a load. The right padded portion **112** is preferably constructed with a somewhat rigid plastic, metal, carbon fiber, or like insert, and a padded underlayer that is directed inward toward the user. The right padded portion **112** has a rear end **130** and an opposed front end **131**. The rear end **130** is proximate to and fixed to the right side **121** of the center panel **111**; when the hip belt **110** is worn, the rear end **130** is proximate the user's back and the front end **131** is proximate the user's front. The right padded portion **112** additionally has a top **132**, a bottom **133**, and an outer face **134** extending across the right padded portion **112** entirely between the top **132** and bottom **133** and between the rear and front ends **130** and **131**. Across the outer face **134**, the right padded portion **112** further carries an adjustable pulley assembly **135**, a strap **136** which is affixed to the outer face **134** of the right padded portion **112**, and a buckle **137**.

The pulley assembly **135** includes a plurality of base or proximal pulleys **140**, a different plurality of distal pulleys **141**, and a cord **142** threaded between the pulleys **140** and

141. The proximal pulleys **140** are secured to the outer face **134** of the right padded portion **112** at the rear end **130** thereof, along a strip of webbing **144**. The proximal pulleys **140** are secured to each other through short webbing jumpers **143**. Each webbing jumper **143** is secured to two adjacent proximal pulleys **140** and is then sewn down to the strip of webbing **144**. And each of the proximal pulleys **140** is arranged proximate the other in a stacked fashion, so that the webbing jumpers **143** are oriented vertically between the proximal pulleys **140**. This holds the proximal pulleys **140** in place and maintains their lateral orientation toward the front end **131**, as shown in FIGS. **6** and **7**.

The distal pulleys **141** are fixed to a yoke strip **145**. The yoke strip **145** is a piece of webbing or other inelastic material, thin and small in size, having opposed long sides. The distal pulleys **141** also have webbing jumpers **146**. The webbing jumpers **146** are secured directly to the yoke strip **145** by strong and rugged reinforced stitching. The distal pulleys **141** are oriented laterally toward the proximal pulley **140** such that they are in a confronting arrangement. Between the proximal and distal pulleys **140** and **141** is a collapsible panel **147**. The right padded portion **112** is somewhat rigid and inflexible between the yoke trip **145** and the front end **131**, but the collapsible panel **147** is a loose panel of flexible, yet inelastic, fabric. The panel **147** can collapse and shrink in its lateral dimension when the pulley assembly **135** contracts.

Preferably, there are half as many distal pulleys **141** as proximal pulleys **140**. In the embodiments shown throughout these drawings, there are two distal pulleys **141**; an upper distal pulley **141** and a lower distal pulley **141**. Likewise, there are two upper proximal pulleys **140** and two lower proximal pulleys **140**. The upper distal pulley **141** corresponds to the two upper proximal pulleys **140**, and the lower distal pulley **141** corresponds to the two lower proximal pulleys **140**.

The winding of the cord **142** through the pulley assembly **135** reflects this correspondence. The cord **142** includes a major pull cord **150** and two minor pulley cords **151** and **152**. The major pull cord **150** is connected to the two minor pulley cords **151** and **152**, extending from them, proximate the proximal pulleys **140**, to a catch **153**. The minor pulley cord **151** wraps through the lower of the upper proximal pulleys **140**, around through the upper distal pulley **141**, back to the upper of the upper proximal pulleys **140**, and then back to the upper distal pulley **141**, where it is anchored. Similarly, the minor pulley cord **152** wraps through the upper of the lower proximal pulleys **140**, around through the lower distal pulley **141**, back to the lower of the lower proximal pulleys **140**, and the back to the lower distal pulley **141**, where it is anchored.

The catch **153** on the cord **142** has two projecting jaws **154** and **155**, defining a space **156** therebetween. The cord **142** is attached to the jaw **154**, which is very short and blunt. Apart from the jaw **154**, the jaw **155** is longer, sharp, curves back toward the jaw **154**, and is formed with an enlarged head **157**. The jaw **154** is useful to be grasped by a user and the jaw **155** is useful for engaging and securing the catch **153** along the right padded portion **112**.

As described above, the strap **136** is fixed to the outer face **120** of the right padded portion **112**. The strap **136** has a rear end **160**, proximate the yoke strip **145**, and an opposed front end **161**, proximate the front end **131** of the right padded portion **112**. The strap **136** is preferably secured to the outer face **120** continuously along the outer face between its rear and front ends **160** and **161**, but not necessarily so. The strap **136** has an outer face **162** directed away from the outer face **120**. The outer face **162**, between the yoke strip **145** and an adjuster buckle **163**, carries a strip of molle **165**. The strip of molle **165** is a strip of spaced-apart nylon loops **166**. The loops **166** are arranged normal to the length of the right padded portion **112**, so that their openings are directed vertically up and down.

At the front end **131** of the right padded portion **112**, the front end of the strap **136** is fixed with stitching. A loop **167** of webbing projects forwardly from the front end **131**, an adjuster buckle **163** is disposed on this loop **167**. Another strap **164** is looped through the adjuster buckle **163**; it has two opposed free ends **168** and **169**. The free end **169** carries a buckle **137**, while the other free end **168** is unadorned and available to be grasped.

In operation, the hip belt **110** is used with a backpack **100** as illustrated in FIG. **8**. Though shown with a traditional internal-frame backpack **100**, the hip belt **110** is useful with external-frame backpacks, soft-frame backpacks, no-frame backpacks, child-carrying packs, and other packs apparatus for carrying loads. Indeed, the hip belt **110** can be used simply as a constriction belt, such as for weight-lifting or medical rehabilitation, where tightening and support about the waist is needed.

A user **101** puts on the backpack **100**, slips the arm straps over his shoulders, and locates the right and left padded portions **112** and **113** around his hips. Preferably, the right and left padded portions **112** and **113** are both in the loosened conditions thereof. The user **101** takes up the straps **136** and **136'** by hand and couples the buckles **137** and **137'** into each other. The buckle **137** snappedly buckles into the complemental buckle **137'** on the left padded portion **113**. The user **101** then moves the hip belt **110** to the tightened condition shown in FIG. **5**.

Returning to FIG. **6**, the right padded portion **112** has an effective length **170** to the buckle **137**. This effective length **170** is measured between the rear end of **130** of the right padded portion **112** and the buckle **137**. Once the buckles **137** and **137'** are coupled to each other, adjusting the effective lengths **170** and **170'** will either loosen or tighten the hip belt **110** on the user. This can be accomplished in one of two, and preferably both, manners. In a first manner, a gross adjustment is made. The user **101** takes up the free end **168** of the strap **164** by hand and pulls it away from the adjuster buckle **163**. This causes the free end **168** to move out away from the adjuster buckle **163** and the front end **161** to move in toward the adjuster buckle **163**, thereby shortening the effective length **170** of the right padded portion **112**. Large adjustments are made in this fashion to quickly take up loose slack in the hip belt **110**. Once the gross adjustment is made, the second manner of adjusting is undertaken. Similarly, the right padded portion **112** also has a pad length **171** between the rear and front ends **130** and **131**. While the pad length **171** remains the same despite adjustment of the strap **164** or the buckle **137**, it does change when the pulley assembly **135** is loosened or tightened.

In the second manner, a fine adjustment is made. After the gross adjustment has been made, the hip belt **110** is fairly well-tightened about the user **101**. However, the fine adjustment allows the user **101** to carefully dial in exactly the desired amount of squeeze on the hip belt **110**. The user grabs the catch **153** by the jaw **154** and pulls it along the molle **165** until the desired tightness about his waist is achieved. When he pulls the catch **153** forward, the minor pulley cords **151** and **152** move in a corresponding fashion and cause the yoke strip **145** to move in the opposite direction, toward the rear end **130** of the right padded portion **112**. This causes the collapsible panel **147** between

the proximal and distal pulleys **140** and **141** to collapse. This is shown in FIG. **7**, which is an illustration of the tightened condition of the right padded portion **112**. In this condition, the effective length **170** has been reduced, as designated with the reference character **170***. Further, the pad length **171** has also been reduced, as designated with the reference character **171***.

The pulley assembly **135** reduces the effect of the pulling on the catch **153**; when the catch **153** is moved forward a distance along the molle **165**, the yoke strip **145** moves backward a lesser distance (and the collapsible portion collapses by a similar lesser distance), so that the user **101** can affect small changes in tightness with large movements and without having to finely control his own movements. A different number of proximal and distal pulleys **140** and **141** would change the mechanical leverage and the reduction factor, and the hip belt **110** is not necessarily limited to the reduction factor of four proximal pulleys **140** and two distal pulleys **141** shown throughout the drawings.

Once the user **101** has found his desired tightness, the user **101** slips the jaw **155** into the proximate loop **166** on the molle **165**. The user **101** fully seats the catch **153** on the loop **166**; once fully seated, the major pull cord **150** pulls on the catch **153** opposite the jaw **155**, and the catch **153** will not yield or inadvertently come loose. The user **101** can, at any time, slightly loosen or tighten the hip belt **110** by removing the catch **153** from the loop **166** and moving it forward or backward by just one or two loops.

FIG. **9** illustrates a backpack **170** with an integrated hip belt **171**. The backpack **170** has a body **172**, a back panel **173**, two shoulder straps **174** extending from the back panel **173**, and the hip belt **171**. The body **172**, back panel **173**, and shoulder straps **174** are exemplary of such conventional parts of a backpack, specifically, an internal-frame hiking backpack, and one having ordinary skill in the art should understand that modifications and different bodies **172**, back panels **173**, and shoulder straps **174** may be suitable. However, the hip belt **171** is uniquely used with the backpack **170** and thus renders the backpack **170** itself.

The hip belt **171** shown in FIG. **9** is similar to the hip belt **10**. Indeed, the hip belt **171** is nearly identical to the hip belt **10**, but that it is attached to the back panel **173** without a center panel **11**. As such, there will not be a detailed description of the structural elements and features of the hip belt **171** that are the same as those of the hip belt **10**. Instead, the reference characters used to identify the various structural elements and features of the hip belt **10** (and of the right and left padded portions **12** and **13**) are used to identify the same structural elements and features of the hip belt **170**. Moreover, the reference characters used with the left padded portion **13** carry the same prime symbol as those of the hip belt **10**. Some of the elements and features of the hip belt **171** are listed below and some are shown on FIG. **9**; others are not for the sake of brevity and clarity, and because one having ordinary skill in the art will understand their structure, location, and arrangement from the description above.

The hip belt **171** thus has a first or right padded portion **12** and a second or left padded portion **13**. The left padded portion **13** is more clearly shown in FIG. **9**. It includes a rear end **30'**, a front end **31'**, a top **32'**, a bottom **33'**, a pulley assembly **35'**, a strap **36'**, a buckle **37'**, proximal pulleys **40'**, distal pulleys **41'**, a cord **42'**, a yoke panel **45'**, a catch **53'**, a front end **61'**, an adjuster buckle **63'**, molle **65'**, and a free end **68'**. Again, not all structural elements and features of the right padded portion **12** of the hip belt **171** are listed or shown, because they are described and shown with respect to the hip belt **10**.

The rear end **30'** of the right padded portion **12** is proximate to and fixed, such as by stitching, sonic welding, or other method, to a left side of the back panel **173**. This places the proximal pulleys **40'** close to the back panel **173**, but still leaves them unencumbered by the back panel **173**. When the back pack **170** is worn and the hip belt **171** is tightened, the distal pulleys **40'**, and indeed, the whole pulley assembly **35'**, are away from the back panel **173** and the body **172** of the bag **170** and as such are not infringed, rubber, or otherwise interfered with. This allows the user to pull on the catch **53'** and adjust it as necessary without resistance from the bag **170**. When the user adjusts the catch **53'**, it tightened or loosened, and the effective length **70'** is shortened or lengthened. The back panel **173** is flexible yet inelastic, like the center panel **11** of the hip belt **10**, and so when the user adjusts the effective length, he or she makes the hip belt **171** snugger or looser.

Although FIG. **9** shows a hip belt **171** which borrows the structural elements and features of the hip belt **10**, one having ordinary skill in the art should readily appreciate that an alternate hip belt—directly attached to the back panel **173**—could borrow the structural elements and features of the hip belt **110**.

A preferred embodiment is fully and clearly described above so as to enable one having skill in the art to understand, make, and use the same. Those skilled in the art will recognize that modifications may be made to the description above without departing from the spirit of the invention, and that some embodiments include only those elements and features described, or a subset thereof. To the extent that modifications do not depart from the spirit of the invention, they are intended to be included within the scope thereof.

The invention claimed is:

1. A hip belt comprising:

a center panel, and first and second padded portions connected to the center panel and extending therefrom;

each of the first and second padded portions comprising:

a rear end proximate to the center panel, an opposed front end, and a face extending therebetween;

a pulley assembly carried on the respective first or second padded portion, and a catch coupled to the pulley assembly for secured engagement along the face;

a strap secured to the pulley assembly over the respective first or second padded portion, wherein the strap carries molle loops for receiving and securely engaging the catch; and

a buckle carried at a front end of the respective first of second padded portion.

2. The hip belt of claim **1**, wherein the strap is secured to the pulley assembly for sliding movement along the face of the respective first or second padded potion.

3. The hip belt of claim **1**, wherein the strap is fixed to the face of the respective first or second padded portion.

4. The hip belt of claim **1**, wherein each of the first and second padded portions further comprises:

an effective length between the buckle and the rear end;

the buckle is adjustable along the strap to grossly adjust the effective length; and

the pulley assembly is adjustable to finely adjust the effective length.

5. The hip belt of claim **4**, wherein each of the first and second padded portions further comprises:

a pad length between the front and rear ends of the respective first or second padded portion;

a loosened condition and a tightened condition of the respective first or second padded portion; and

during movement between the loosened and tightened condition, the effective length changes and the pad length remains unchanged.

6. The hip belt of claim **5**, wherein, for each of the first and second padded portions, during movement from the loosened condition to the tightened condition, the strap moves toward the rear end of the respective first or second padded portions.

7. The hip belt of claim **1**, wherein each of the first and second padded portions further comprises a transverse band at the front end of the respective first or second padded portion, the strap extending between the band and the respective first or second padded portion.

8. The hip belt of claim **1**, wherein each of the first and second padded portions further comprises:

the pulley assembly comprises proximal pulleys located at the rear end of the respective first or second padded portion, distal pulleys located between the front and rear ends, and a cord wound around the proximal and distal pulleys; and

a catch coupled to the cord, wherein movement of the catch toward the front end tightens the pulley assembly and movement of the catch away from the front end loosens the pulley assembly.

9. A hip belt comprising:

a center panel, and first and second padded portions connected to the center panel and extending therefrom;

each of the first and second padded portions comprising:

a rear end proximate to the center panel, an opposed front end, and a face extending therebetween;

a pulley assembly carried on the respective first or second padded portion, wherein the pulley assembly comprises proximal pulleys located at the rear end of the respective first or second padded portion, distal pulleys located between the front and rear ends, and a cord wound around the proximal and distal pulleys;

a catch coupled to the cord, wherein movement of the catch toward the front end tightens the pulley assembly and movement of the catch away from the front end loosens the pulley assembly

a strap secured to the pulley assembly over the respective first or second padded portion; and

a buckle carried at the front end of the respective first or second padded portion.

10. The hip belt of claim **9**, wherein the strap is secured to the pulley assembly for sliding movement along the face of the respective first or second padded portion.

11. The hip belt of claim **9**, wherein the strap is fixed to the face of the respective first or second padded portion.

12. The hip belt of claim **9**, wherein each of the first and second padded portions further comprises:

an effective length between the buckle and the rear end;

the buckle is adjustable with respect to the front end to grossly adjust the effective length; and

the pulley assembly is adjustable to finely adjust the effective length.

13. The hip belt of claim **12**, wherein each of the first and second padded portions further comprises:

a pad length between the front and rear ends of the respective first or second padded portion;

a loosened condition and a tightened condition of the respective first or second padded portion; and

movement between the loosened and tightened condition changes both the effective length and the pad length.

14. The hip belt of claim **13**, wherein, during movement from the loosened condition to the tightened condition, the strap moves toward the rear end of the respective first or second padded portions.

15. The hip belt of claim **9**, wherein the strap of each of the first and second padded portions carries molle loops for receiving and securely engaging the catch.

16. A hip belt comprising:

a center panel, and first and second padded portions connected to the center panel and extending therefrom;

each of the first and second padded portions comprising:

a rear end proximate to the center panel, an opposed front end, and a face extending therebetween;

a pulley assembly carried on the respective first or second padded portion, wherein the pulley assembly comprises proximal pulleys located at the rear end of the respective first or second padded portion, distal pulleys located between the front and rear ends, and a cord wound therebetween;

a collapsible panel between the proximal and distal pulleys which collapses when the pulley assembly contracts; and

a buckle carried at a front end of the respective first of second padded portion.

17. The hip belt of claim **16**, wherein each of the first and second padded portions further comprises:

a pad length between the front and rear ends, and an effective length between the buckle and the rear end;

the buckle is adjustable to grossly adjust the effective length; and

the pulley assembly is adjustable to finely adjust the effective length.

18. The hip belt of claim **16**, wherein each of the first and second padded portions further comprises:

a catch coupled to the cord, wherein movement of the catch toward the front end tightens the pulley assembly and movement of the catch away from the front end loosens the pulley assembly.

19. The hip belt of claim **16**, wherein when the pulley assembly is adjusted, the effective length changes and the pad length remains unchanged.

20. The hip belt of claim **16**, wherein when the pulley assembly is adjusted, both the effective length and the pad length change.

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