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Schone et al.

[11] **3,774,825**

[45] **Nov. 27, 1973**

[54] **BACK PACK FOR UNDERWATER BREATHING APPARATUS AND THE LIKE**

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[73] Assignee: **said Schone and Geer, by said Laxineta and Koistinen**

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[52] **U.S. Cl.** ..... **224/25 A**, 224/5 W

[51] **Int. Cl.** **A45f 3/00**

[58] **Field of Search** ..... 224/25 A, 5 W, 8 R, 224/8 A, 9, 11, 5 B, 5 A, 26 B, 26 R, 5 P, 5 MQ, 5 MA

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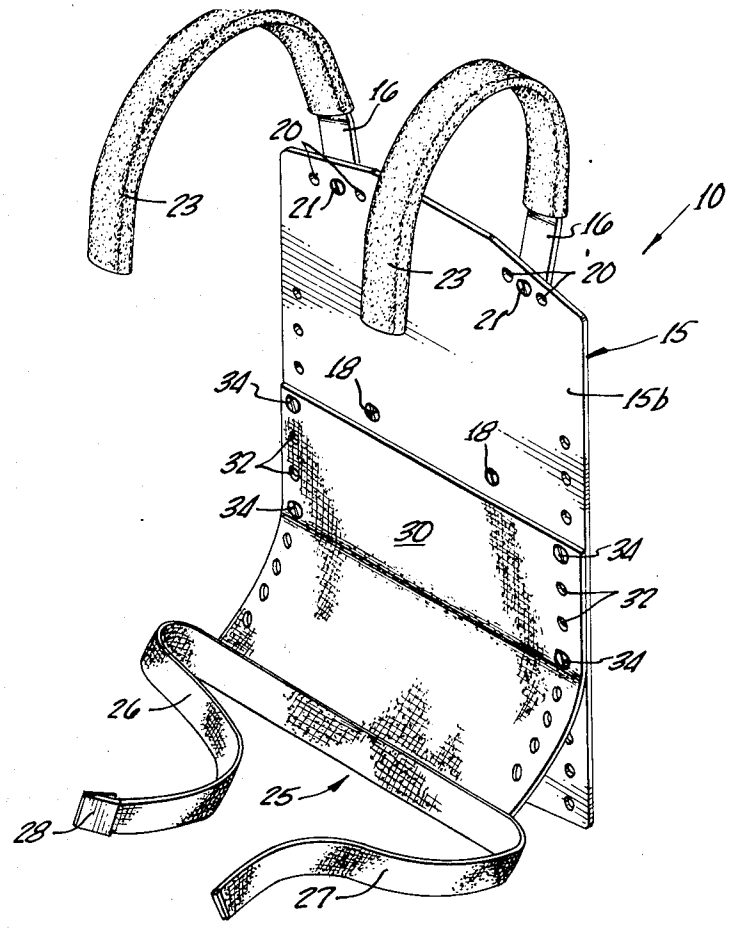
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Assistant Examiner—Jerold M. Forsberg
Attorney—Philip M. Hinderstein

[57] **ABSTRACT**

A pack for carrying compressed air or gas-filled cylinders on the back of a human body comprising a flat, rigid frame; first and second substantially U-shaped, rigid, shoulder engaging hangers pivotably connected to an upper portion of the frame; a hip or waist surrounding and engaging belt having disengagable belt portions and belt fastening means securing the belt portions together; and a rectangular fabric sheet connected between a lower portion of the frame and the belt. The upper end of the fabric sheet is connectable at any one of a plurality of positions along the frame with the remainder of the fabric sheet extending downwardly. The lower end of the fabric sheet is fixedly connected to the belt. Finally, any one of a plurality of intermediate positions along the fabric sheet is connectable at any one of a plurality of positions along the lower portion of the frame to adjust the overall length between the hangers and the belt and also the length between the belt and the selected position along the lower portion of the frame.

9 Claims, 6 Drawing Figures



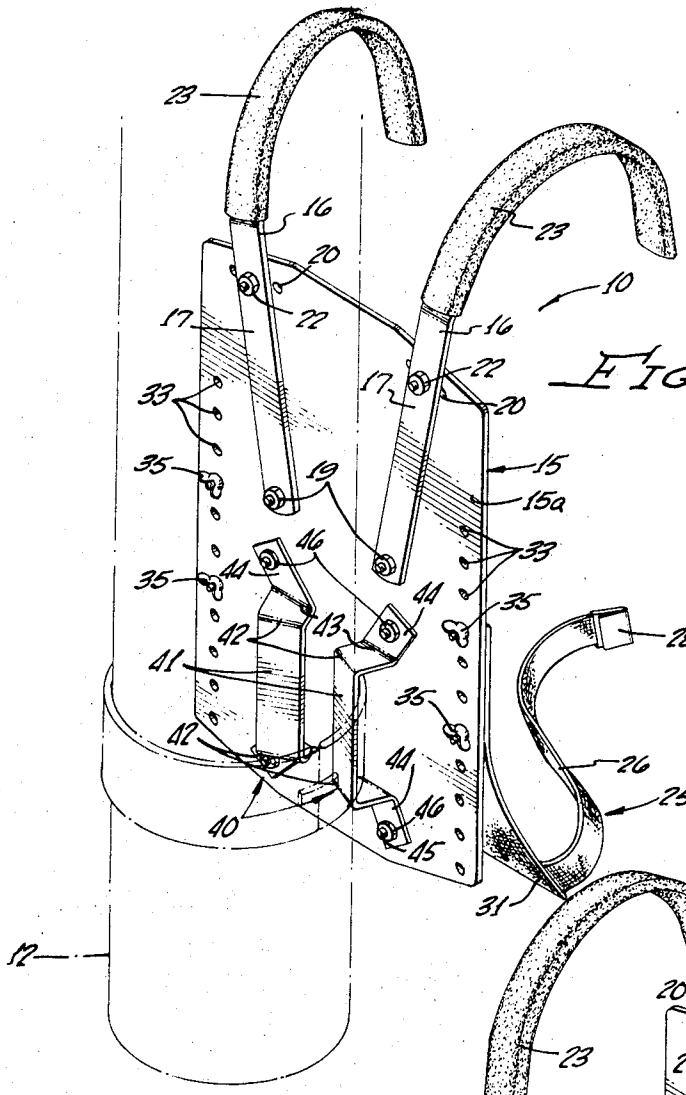

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FIG. 1.

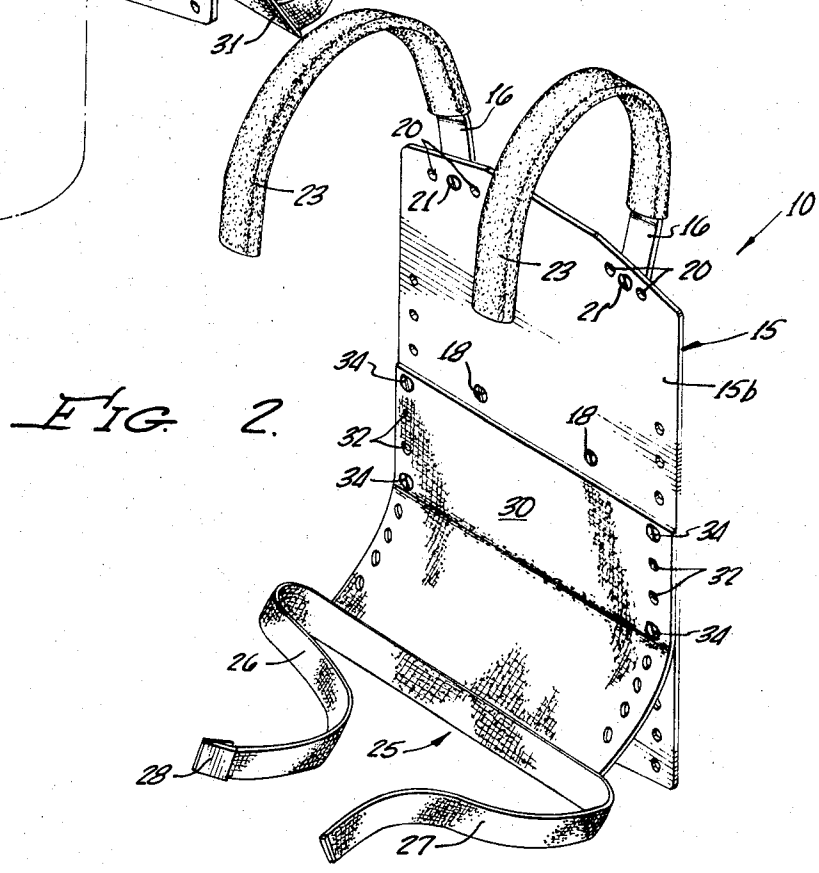

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FIG. 2.

FIG. 3

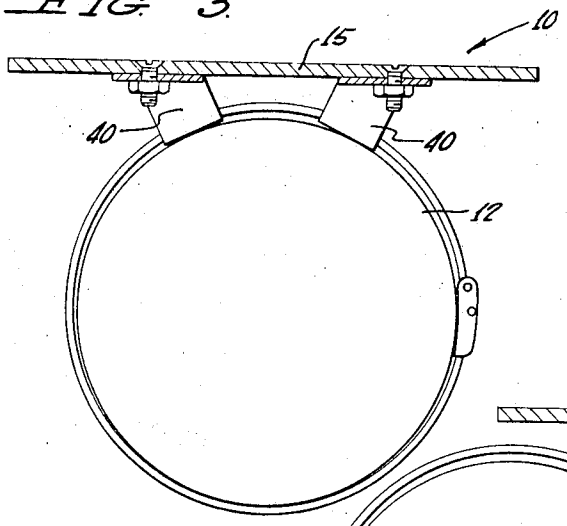


FIG. 4

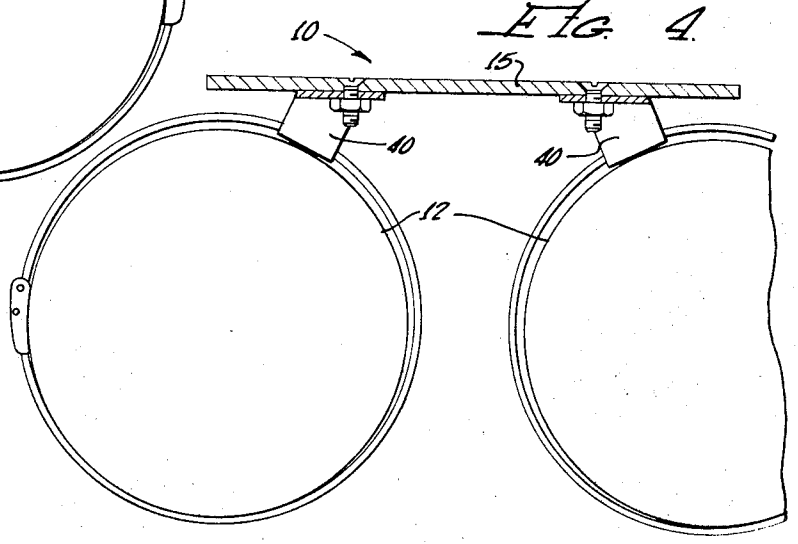


FIG. 5

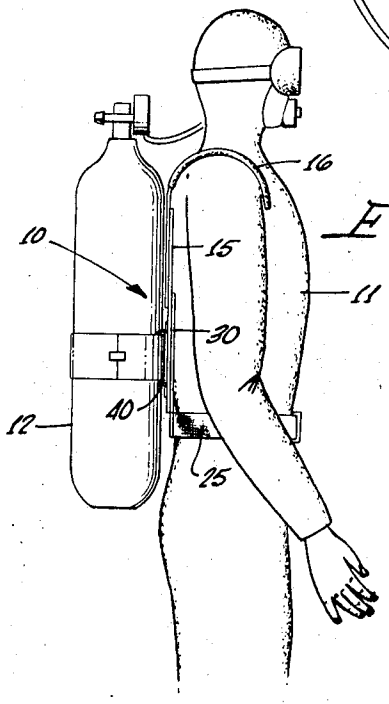
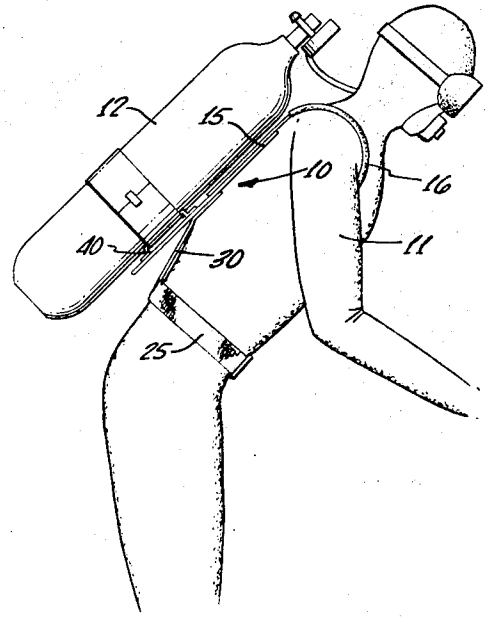


FIG. 6



BACK PACK FOR UNDERWATER BREATHING APPARATUS AND THE LIKE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a back pack for carrying compressed air or gas-filled cylinders and the like and, more particularly, to a pack for carriage on the back of a human body which has increased comfort without undue constraint and which may be quickly and easily donned or shed.

2. Description of the Prior Art

Back packs are well known and widely available for carrying a variety of different objects. For example, back packs are used by hikers, climbers, and mountaineers to carry a wide variety of camping and hiking equipment. Back packs are also worn by underwater swimmers for carrying compressed air, high pressure cylinders which supply air to the swimmer. Similar packs are also used to carry portable welding apparatus including two gas-filled cylinders. While the present back pack is equally applicable to any of these fields, it will be described in its preferred embodiment, namely as a back pack to be worn by an underwater swimmer for carrying one or two compressed air, high pressure cylinders.

A typical back pack for carrying compressed air cylinders includes a back plate sculptured to fit the contour of the back in order to hold the tank or tanks in correct position for the swimmer. The upper and lower portions of such back plates are connected to the body of the swimmer by a harness including a continuous strap which extends over the shoulders and around the waist. Finally, releasable bands connect the tanks to the back plate.

In spite of the fact that back packs of this type are widely used, several problems are associated therewith. In the first instance, the straps which connect the back plate to the body of the swimmer are cumbersome so that it is difficult to get into and out of the pack. In addition, since the straps are continuous, carrying the pack by holding the straps causes the straps to pull through the various slots in the back plate, requiring re-adjustment when put on. Alternatively, additional accessories are needed to lock the straps in place.

A significant problem results from the fact that the straps create a rigid connection between the back plate and the body of the swimmer. As a result, it is difficult, at best, to stoop when wearing such back packs, the mobility of the swimmer being substantially limited. To minimize the constraints placed on the movements of the swimmer, existing back plates are usually sculptured to conform to the back of a human body. While this partially solves one problem, it creates another in that sculptured back plates create manufacturing problems so that existing back packs are relatively expensive.

Another problem with most existing back packs is that they are usually designed to carry either a single tank or two tanks and it is not possible to use a single back pack to carry one tank or two, at the swimmer's option.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided a back pack for carriage on the back of a human body and, more particularly, on the back of a swimmer, for carrying one or more compressed air tanks, which solve the above problems. In the first instance, the present back pack completely eliminates the use of cumbersome straps so that the present pack is easy to don or shed, whether in the water or out. The present back pack also eliminates the sculptured back plates contoured to fit the back of the swimmer and the expense associated with the manufacture of such back plates. The back plate of the present invention is connected to the back of the swimmer in a flexible manner which allows the swimmer to stoop without undue constraint. The arrangement of the present back pack permits the swimmer to tighten a hip engaging belt to suit his taste, yet does not inhibit motion of the body, while providing lateral stability for the loaded pack and restraining it from moving forward off the swimmer's shoulders. Finally, the present back pack may be used to carry either a single tank or a pair of tanks with a simple rearrangement of certain of the parts thereof.

Briefly, the present pack comprises a flat, rigid frame; first and second substantially U-shaped, rigid, shoulder engaging hangers pivotably connected to an upper portion of the frame; a hip or waist surrounding and engaging belt having disengagable belt portions and belt fastening means securing the belt portions together; and a rectangular fabric sheet connected between a lower portion of the frame and the belt. The upper end of the fabric sheet is connectable at any one of a plurality of positions along the frame with the remainder of the fabric sheet extending downwardly. The lower end of the fabric sheet is fixedly connected to the belt. Finally, any one of a plurality of intermediate positions along the fabric sheet is connectable at any one of a plurality of positions along the lower portion of the frame to adjust the overall length between the hangers and the belt and also the length between the belt and the selected position along the lower portion of the frame.

OBJECTS

It is therefore an object of the present invention to provide a back pack for carrying compressed air or gas-filled cylinders and the like.

It is a further object of the present invention to provide a back pack for underwater breathing apparatus and the like which completely eliminates the need for conventional shoulder harnesses.

It is a still further object of the present invention to provide a back pack for underwater breathing apparatus and the like which is easy to don or shed, whether in the water or out.

It is another object of the present invention to provide a back pack for underwater breathing apparatus and the like which eliminates the need for sculptured back plates.

It is still another object of the present invention to provide a back pack for underwater breathing apparatus and the like which allows a swimmer to stoop without undue constraint.

Another object of the present invention is the provision of a back pack for underwater breathing apparatus and the like which may be used to carry either a single compressed air tank or a pair of tanks.

Still other objects, features, and attendant advantages of the present invention will become apparent to those skilled in the art from a reading of the following detailed description of the preferred embodiment con-

structed in accordance therewith, taken in conjunction with the accompanying drawings wherein like numerals designate like parts in the several figures and wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the present back pack for underwater breathing apparatus and the like as viewed from the back thereof;

FIG. 2 is a perspective view of the back pack of FIG. 1 as viewed from the front thereof;

FIG. 3 is a sectional view of the back pack of FIG. 1 showing the configuration of the back pack for receiving a single compressed air cylinder;

FIG. 4 is a partial, lateral sectional view of the back pack of FIG. 1 showing the configuration of the back pack for receiving two compressed air cylinders; and

FIGS. 5 and 6 are views showing the back pack of FIGS. 1 and 2 in position on a swimmer and particularly showing the manner in which the swimmer may stoop without undue constraint.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is shown a back pack, generally designated **10,** for carriage on the back of a human body. Back pack **10** may be used by hikers, climbers, and mountaineers to carry camping and hiking equipment or may be used by a welder to carry gas-filled clyinders. However, back pack **10** will be described for its preferred use, namely as a back pack to be worn by an underwater swimmer **11** for carrying one or two compressed air, high pressure cylinders **12.**

Back pack **10** includes a back plate or frame **15** having an outer side **15***a* and an inner side **15***b* which is adapted to contact the back of swimmer **11.** Back plate **15** is a generally rectangular, flat, rigid member whose longitudinal dimension is adapted to be positioned vertically. The four corners of back plate **15** may be rounded or otherwise configured, as desired.

Back pack **10** further comprises first and second substantially U-shaped, rigid, shoulder engaging hangers **16** connected to and suspending back plate **15.** Hangers **16** are adapted to be connected to back plate **15** so as to be pivotably adjustable relative thereto, to permit variation of the angle between hangers **16** and the longitudinal axis of frame **15.** Such pivotable adjustment allows variation for different sizes of swimmers.

According to the preferred embodiment of the present invention, a pivotable connection between hangers **16** and back plate **15** is accomplished by forming first arms **17** of hangers **16** longer than the other arms thereof and by providing arms **17** with first and second spaced holes. Back plate **15** is provided with a first pair of holes for receipt of bolts **18** which extend through back plate **15** from inner side **15b** thereof. Bolts **18** then extend through the holes at the outer ends of arms **17** of hangers **16** and engage nuts **19.** Bolts **18** and nuts **19** provide the pivot points for hangers **16.**

Back plate **15** is further provided with first and second sets of holes **20,** each set including two or three or more holes, all positioned on a radius around bolts **18.** The other holes in arms **17** of hangers **16** are adapted to be aligned with any of holes **20** in the two sets. Therefore, by extending a bolt **21** through one of holes **20** of each set and securing such bolt with a nut **22,** the angular position of hangers **16** may be adjustably selected. Furthermore, by countersinking the holes in back plate **15** and by using flat head bolts, inner side **15b** of back plate **15** remains entirely smooth for contact with the back of swimmer **11.** Hangers **16** may be padded, such as with rubber covers **23,** for the comfort of swimmer **11.**

Back pack **10** further comprises a hip or waist surrounding and engaging belt, generally designated **25,** of generally conventional configuration. Belt **25** may be a single length of belt material defining disengagable belt portions **26** and **27** which may be secured together by means of a conventional belt fastening buckle **28.**

Hangers **16** of back pack **10** provide three directions of support for back plate **10,** preventing forward and back motion and downward motion. In order to provide the fourth direction of support, to prevent upward motion of back plate **15,** back plate **15** is connected to belt **25.** According to the present invention, back plate **15** is connected to belt **25** by flexible suspension means, generally designated **30,** which allows swimmer **11** to stoop without undue constraint. More specifically, and with reference primarily to FIG. **2,** flexible suspension means **30** comprises a generally rectangular fabric sheet connected between back plate **15** and belt **25,** the width of fabric sheet **30** being approximately equal to the width of frame **15.** The lower end **31** of fabric sheet **30** is fixedly connected to a central portion of belt **25** such as by stitching belt **25** to sheet **30** or by making sheet **30** integral with belt **25.**

Sheet **30** includes first and second columns of equally spaced holes **32** along the opposite sides thereof. Back plate **15** has first and second identical columns of equally spaced holes **33** along the opposite sides thereof. By providing fabric sheet **30** and back plate **15** with identical columns of holes, fabric sheet **30** is adapted to be positioned anywhere along the length of back plate **15** with holes **32** in fabric sheet **30** aligned with holes **33** in back plate **15.** Accordingly, fabric sheet **30** may be connected to back plate **15** by extending a plurality of fasteners through corresponding holes in sheet **30** and frame **15.** Such fasteners may comprise bolts **34** and wing nuts **35.**

Two significant features of fabric sheet **30** should be noted. In the first instance, sheet **30** is connectable to back plate **15** in a manner which permits vertical adjustment of belt **25** relative to frame **15** and hangers **16** to accomodate various sizes of swimmers. Accordingly, when the desired vertical size is selected, a pair of bolts **34** and wing nuts **35** may be used to connect the upper pair of holes **32** in sheet **30** to the selected pair of holes **33** in back plate **15.** In addition, with fabric sheet **30** now extending downwardly from a selected position along frame **15,** any one of a plurality of intermediate positions along fabric sheet **30** is adapted to be connected at any one of a plurality of positions along the lower portion of frame **15.** As shown in FIGS. **1** and **2,** connection is achieved by extending an additional pair of bolts **34** through any remaining pair of holes **32** in fabric sheet **30** and a corresponding pair of holes **33** in back plate **15,** bolts **34** being secured by wing nuts **35.**

With the construction just described, back pack **10** provides complete adjustment of the length of the flexible section between lower end **31** of fabric sheet **30** and the point at which an intermediate portion of fabric sheet **30** is connected to back plate **15.** This flexible section between belt **25** and frame **15** allows swimmer **11** to bend over without undue constraint, as shown in FIG. **6.** This arrangement permits swimmer **11** to

tighten belt 25 to suit his taste, yet does not inhibit motion of his body while still providing lateral stability for the loaded pack and restraining it from moving forward off of his shoulders.

As mentioned previously, back pack 10 is designed to be worn by an underwater swimmer 11 for carrying one or two compressed air, high pressure cylinders 12. For this purpose, back pack 10 includes first and second identical brackets, generally designated 40. Each of brackets 40 is made from an elongated length of flat, sheet stock, such as aluminum. On either side of a central section 41, the sheet stock is bent through an angle of 90° along lines 42 perpendicular to the length of the sheet stock. The ends 44 of the sheet stock are then bent in the opposite direction through an angle of 90° along lines 43 positioned at an angle of approximately 22° relative to the length of the sheet stock. Ends 44 of bracket 40 have holes therein which are adapted to be aligned with a pair of spaced, vertically aligned holes in back plate 15. Connection of bracket 40 to back plate 15 is made with a pair of blots 45 which extend through corresponding holes in ends 44 and back plate 15 and engage nuts 46. Furthermore, by countersinking the holes in back plate 15 and by using flat head bolts, inner side 15*b* of back plate 15 remains entirely smooth for contact with the back of swimmer 11.

It can therefore be seen that with ends 44 of brackets 40 connected to back plate 15, central sections 41 will be spaced from back plate 15 and angularly positioned relative thereto by the same angle as that between line 43 and the length of bracket 40. That is, with brackets 40 in the position shown in FIGS. 1 and 3, central sections 41 of brackets 40 face inwardly and provide angular surfaces for contacting the outer surface of a single high pressure cylinder 12. With a single cylinder 12 so positioned, connection to back plate 15 is achieved through the use of conventional clamps which surround tank 12 and central sections 41 of both of brackets 40. On the other hand, when it is desired to use two compressed air cylinders, back pack 10 may be readily converted to such use by removing each of brackets 40 and reconnecting them as shown in FIG. 4. In this position, central sections 41 of brackets 40 face outwardly and provide a single surface to engage the outer surface of each of a pair of tanks 12. As is conventional, a pair of clamps would be used to individually connect tanks 12 to each of brackets 40.

It can therefore be seen that in accordance with the present invention, there is provided a back pack 10 for carriage on the back of a human body for carrying one or more compressed air tanks 12, which solves many of the existing problems of the prior art. In the first instance, back pack 10 completely eliminates the use of cumbersome straps and shoulder harnesses so that back pack 10 is easy to don or shed, whether in the water or out. Hangers 16 also provide a convenient carrying handle and a hook for hanging pack 10 on boarding ladders, gunwales, car seats, and the like. Back pack 10 also eliminates sculptured back plates contoured to fit the back of swimmer 11 and the expense associated with the manufacture of such back plates. Back plate 15 of back pack 10 may be entirely flat since it is connected to the back of swimmer 11 in a flexible manner which allows swimmer 11 to stoop without undue constraint. The arrangement of back pack 10 permits swimmer 11 to tighten belt 25 to suit his taste, yet does not inhibit motion of his body while providing lateral stability for the loaded pack and restraining it from moving forward off of his shoulders.

The design of back pack 10 provides sufficient adjustment to accomodate various sizes of swimmers 11. Since the fit of pack 10 is determined solely by the positioning of the various adjustments and the attachment of pack 10 to swimmer 11 is by means of these adjustable devices, pack 10 is equally comfortable for all sizes of individuals.

Finally, back pack 10 may be utilized to carry either a single tank 12 or a pair of tanks 12 with only a simple rearrangement of the position of brackets 40 relative to back plate 15.

While the invention has been described with respect to a preferred physical embodiment constructed in accordance therewith, it will be apparent to those skilled in the art that various modifications and improvements may be made without departing from the scope and the spirit of the invention. Accordingly, it is to be understood that the invention is not to be limited by the specific illustrative embodiment, but only by the scope of the appended claims.

We claim:

1. A pack for carriage on the back of a human body comprising:
   - a rigid frame having upper and lower portions;
   - first and second substantially U-shaped, rigid, shoulder engaging hangers suspending said frame and connected to said upper portion thereof;
   - a hip or waist surrounding and engaging belt having disengageable belt portions and belt fastening means securing said belt portions together;
   - flexible suspension means having upper and lower ends, said lower end of said suspension means being fixedly connected to said belt; means for connecting said upper end of said suspension means to said frame at any one of a plurality of positions along said frame, said suspension means extending downwardly from said frame thereby tensioning said frame on said shoulders to prevent upward movement and disengagement of said hangers from said shoulders.

2. A back pack according to claim 1 wherein the inner and outer surfaces of said frame are flat.

3. A back pack according to claim 1 wherein said shoulder engaging hangers are pivotably connected to said upper portion of said frame to permit adjustment of the angle between said hangers and the vertical, longitudinal axis of said frame.

4. A back pack according to claim 3 wherein one arm of each of said hangers is longer than the other, wherein said longer arm is connected to said frame at two points along the length thereof, one of said points being fixed, the other of said points being variable.

5. A back pack according to claim 1 further comprising:
   - bracket means secured to said frame for permitting connection thereto of one or two compressed air tanks.

6. A back pack according to claim 5 wherein said bracket means comprises:
   - a pair of identical brackets, each of said brackets including a central section and opposite ends, said ends being connectable to said frame to hold said central section in spaced relationship relative thereto, said central section being disposed at an acute angle relative to said frame, said brackets

being positionable with said central sections facing inwardly for support of a single air tank or facing outwardly fo support of a pair of air tanks.

7. A back pack according to claim 1 further comprising:

means for connecting any one of a plurality of intermediate positions along said suspension means to said frame at any one of a plurality of positions along said lower portion thereof.

8. A back pack according to claim 7 wherein said flexible suspension means comprises a rectangular fabric sheet having a width substantially equal to the width of said frame, said sheet having first and second columns of holes along the opposite sides thereof, wherein said frame has first and second identical columns of holes along the opposite sides thereof, wherein said connecting means comprises:

a plurality of fasteners extending through corresponding holes in said sheet and said frame for connection of said sheet to said frame.

9. A back pack according to claim 8 including four of said fasteners, two of said fasteners connecting the upper pair of holes in said sheet to a selected pair of said holes in said frame, the other two of said fasteners connecting any remaining pair of holes in said sheet to a corresponding pair of holes in said frame.

* * * * *