United States Patent [19]

Plant

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[54] **PACK FRAME HAVING PULLEY ADJUSTING STRAPS**

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

[51] **Int. Cl.** **A45f 3/10**

[58] **Field of Search** ..... 224/25 A, 8 R, 8 A, 5 W

[56] **References Cited**

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Assistant Examiner—Jerold M. Forsberg

[57] **ABSTRACT**

This invention is concerned with a strap and pulley assembly mounted on a back pack frame. A back pack frame is a device that hikers employ to carry a load of supplies and/or equipment on their back. On the lower side of each of the frame members are mounted pulley assemblies. The straps that connect the frame to the person pass through the pulley assemblies and fasten to the front of the person's body. With this invention, the weight on the pack is no longer carried solely on the back and shoulders, but the weight is more evenly distributed to other parts of the body. The pulleys have means for locating them in order to conform to the person's configuration. There is a separate bracket for locking the pulley means into fixed positions.

8 Claims, 9 Drawing Figures

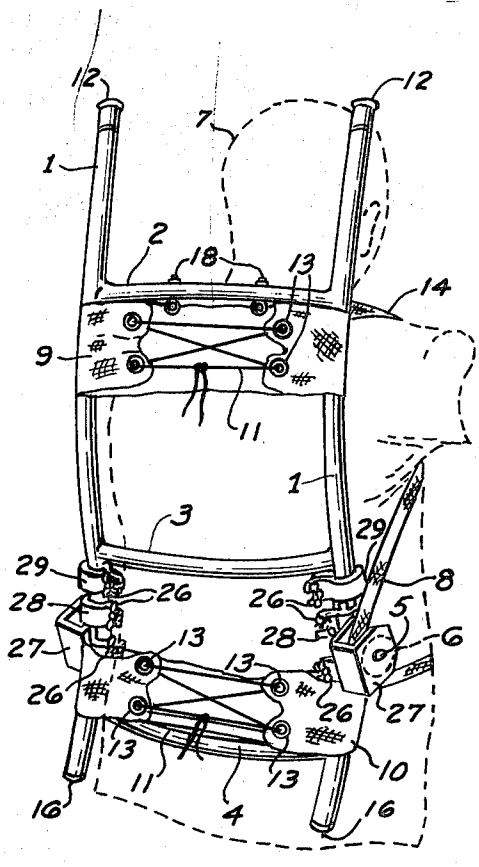


Fig-1-

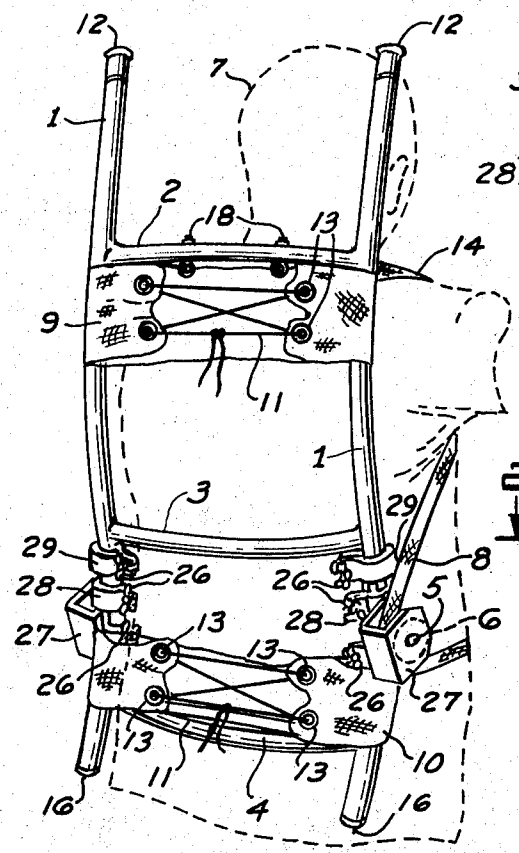


Fig-2-

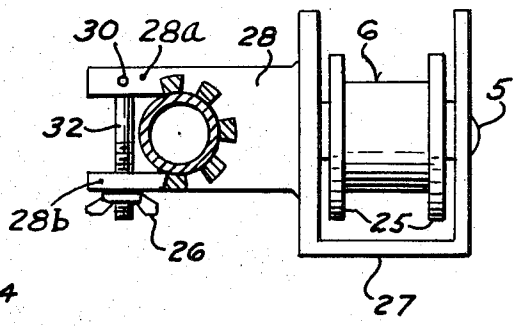


Fig-3-

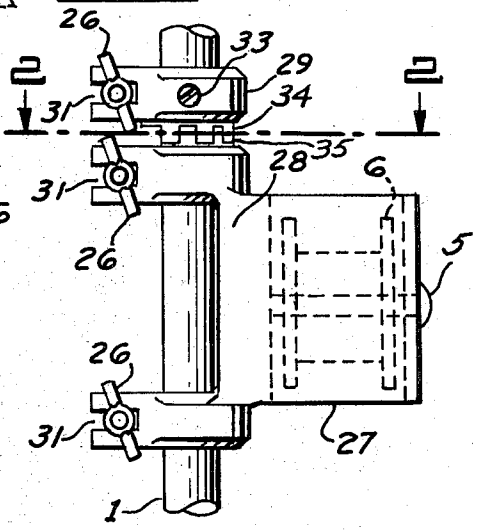


Fig-4-

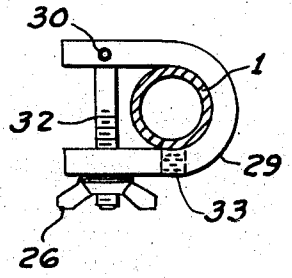


Fig. 5

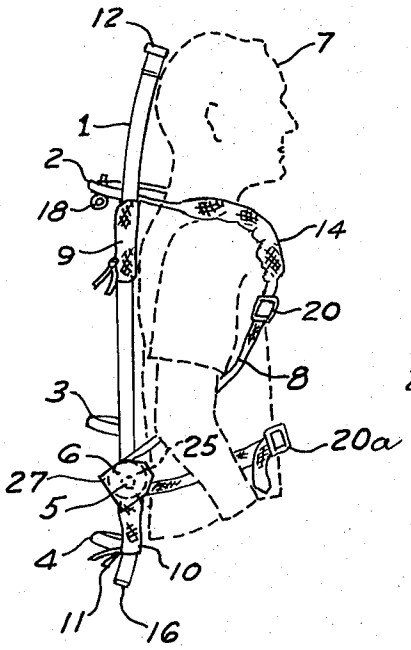


Fig. 6

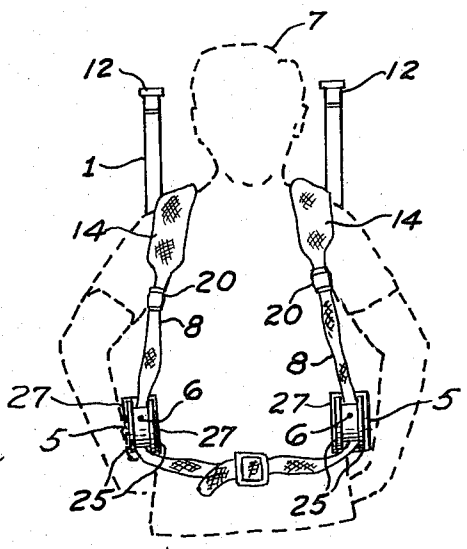


Fig. 7

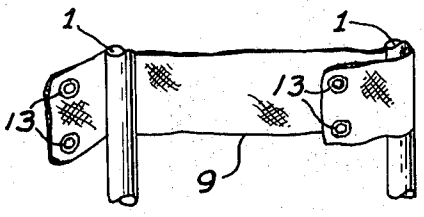


Fig. 8

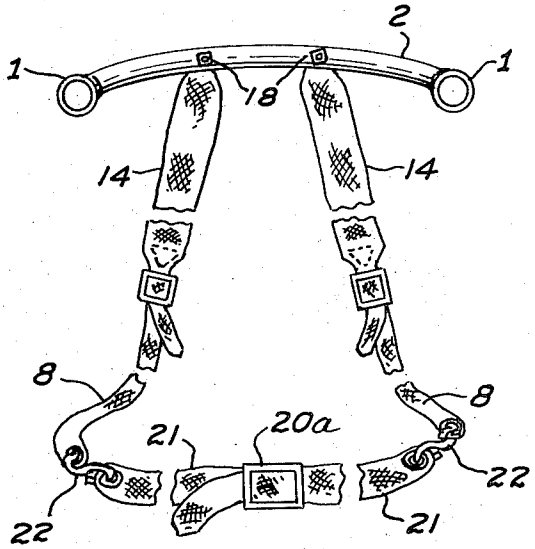
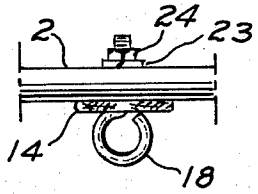


Fig. 9



PACK FRAME HAVING PULLEY ADJUSTING STRAPS

This invention is concerned with a strap and pulley assembly mounted on a back pack frame. A back pack frame is designed to carry a load of equipment or supplies on a person's back when hiking or perhaps a fireman or the like carrying fire fighting equipment. There are several types of back pack frames.

It is an object of the within invention to provide a strap and pulley system that can be installed on any type or style of back pack frame.

The presently manufactured back pack frame is carried on a person's back by means of two shoulder straps fastened to the top of the frame and over the top of each of the person's shoulders. The other end of the straps fasten to the bottom of the frame. This type of a frame carries most of the weight on the person's shoulders and his back directly behind the spinal column and the shoulder blade area of the person's back. This causes fatigue and prevents free movement of the arms and neck. The carrying straps press into the shoulders and slow down the blood circulation.

On lengthy trips it is uncomfortable and painful to use this arrangement.

The shoulder straps of the within invention do not press on top of the shoulders but distribute the weight to other parts of the body.

It is yet another object of the within invention to provide a pack carrier that has an adjusting strap arrangement.

It is still an additional object of the within invention to provide a strap for the pack carrier that will give comfort, rather than distress, to the person carrying the pack.

It is yet additional object to provide a light-weight pack carrier that has an adjustable light-weight pulley means for equalizing the weight forces on the straps of the person carrying the pack.

The pulley arrangement of this invention is designed to act as a lever system to lift the weight of the pack from the person's shoulders and to distribute the weight over other parts of the person's body.

With this invention the weight is not carried only on the back and shoulders but at the hips and the legs.

The aforesaid objects are obtained by the use of two pulleys that are mounted on the pack carrier. The pulleys are located below each of the arms and at the proximate height of the hips. The pulleys are, therefore, mounted on the lower end of the frame. The straps for carrying the pack frame circle the back of the pulleys and attach at the waist.

For a more detailed understanding of this invention reference is made to the following specifications and to the drawings, in which:

FIG. 1 is a perspective view of the rear of the pack frame showing the location and mounting of the pulleys.

FIG. 2 is a top plan view partially in section of a typical pulley mounted on the frame taken along line 2 — 2 of FIG. 3.

FIG. 3 is a side elevational view of the pulley mounted on the frame.

FIG. 4 is a top plan view of the pulley lock bracket.

FIG. 5 is a side elevational view showing how the straps are worn by the person carrying the pack frame.

FIG. 6 is a front elevational view partially in perspective showing the location of the pulleys and the straps on the front of the person carrying the pack frame.

FIG. 7 is a view in perspective of the canvas cover being applied to the pack frame.

FIG. 8 is a view in perspective of the straps and that portion of the frame to which they are connected.

FIG. 9 is a top plan view of the hardware for mounting the strap to the frame.

A light-weight upright tube 1 is connected to a horizontal cross-bar tube 2. The other end of the cross-bar tube 2 is connected to another tube upright 1. The tube members 1 have a slight bend in them near the bottom as can be seen in the view of FIG. 1 forming somewhat the curvature of the back of a person. There is a middle cross-bar horizontal tube 3 connecting the two tube members 1, just above the bend in tubes 1. Also beneath the cross-bar tube 3 is a lower horizontal cross-bar tube 4. Essentially, the frame is conventional, having the two upright members 1 and the three horizontal cross-connecting members, 2, 3, and 4.

Mounted near the bottom of each upright frame 1 above the cross-bar 4 is a pulley assembly. There is a pulley shaft 5. This can be seen clearly in the view of FIG. 2. The pulley 6 is mounted on the pulley shaft 5. See FIG. 2 and the dotted lines in the view of FIG. 3. Pulley 6 has ridges protruding from its main surface which are hereinafter referred to as pulley flanges 25.

There is in the view of FIG. 1 a man 7 drawn in phantom dotted lines to orient the position of the frame assembly 1 - 2 - 3 - 4 upon the back of the man 7. There is a strap 8 which connects around the pulley and fastens over the shoulders of the man 7. There are various component parts of the strap 8 which can be seen in the views, particularly of FIGS. 5, 6 and 8.

In the views of FIG. 1 and 7 is the canvas cover 9 which is fastened below the upper cross-bar 2. There are eyelets 13 in the canvas cover 9 through which tying strings 11 are fastened. Similarly, in the lower portion of the frame assembly is the canvas cover 10. There are eyelets 13 in the lower portion of lower canvas cover 10 in which the laces 11 are also fastened.

At the top of each of the tube frame members 1 are plastic covers 12 which prevent the rough edges of the tube 1 from doing any injury or damage to the person 7. At the bottom of the tubes 1 are similar types of plugs or covers 16 for the same purpose of protecting the person 7 from injury from the rough edges of the bottom of the tubes 1.

In the view of FIG. 5 at the upper portion of the strap 8 above the adjusting buckle 20 is a padded strap segment 14. The padded strap segment 14 is connected to the cross-bar 2. In the views of FIGS. 1 and 8 can be seen two separate eye bolts 18 to which the strap 14 are connected. The eye bolts are conventional and can be seen clearly in the view of FIG. 9. The top of eye bolt 18 is circular in shape permitting the person to adjust the straps and tighten them with his fingers. The straps 14 are shown connected between the bottom of the tube 2 and the eye bolt 18. On the other side of the tube 2 are the lock washers 23 and the nut 24 for the eye bolt 18.

Reference is made to the strap assembly as shown in FIG. 8. The upper portion **14** is the padded part of the strap and as stated is connected to the eye bolt **18** on the cross-bar **2.** There is a buckle **20** for adjusting the length of the strap segment **8** as shown in the view of FIG. **5** and is the half-way buckle. Connected to the half-way buckle **20** is the strap segment **8.** Connected to the strap segment **8** is the S-shaped connector **22** which permits the strap to fit around the person without twisting. The S-shaped connector **22** is connected to the wide front strap **21.** The wide front strap **21** is interconnected with the adjustable buckle **20***a* which connects a symmetrical side of the strap assembly to the right of the view of FIG. **8.**

The pulley assembly which can be seen in the view of FIGS. **1, 3** and **6** comprises of a bifurcated clamp bracket **28.** Bracket **28** can be seen in view of FIG. **2.** One portion of bracket **28** surrounds one portion of the tube **1.** There is a slotted opening in bracket **28** which permits the tube **1** to fit snugly within the clamp arms **28***a* and **28***b*.

Passing through openings or slots **31** are the bolts **32** with their wing nuts **26** for locking the bracket **28** to the upright tube **1.** As stated, the bracket **28** is bifurcated and there is a similar clamp assembly both at the upper and the lower portion of the bracket **28** as described.

Connected to the bracket **28** is the pulley housing **27** which is U-shaped in the view of FIG. **2.** The housing **27** covers the pulley **6** on two sides and the rear, permitting the strap **8** to pass without forward obstruction.

There is a pivot pin **30** located in the bracket **28** as seen in FIG. **2** and by which the bolt **32** is moveably secured to the bracket **28.** The bolt **32,** therefore, can slide in and out of slot **31** on its pivot pin **30.**

There is a lock bracket assembly **29** which has a somewhat similar structure as just described for bracket **28.** This is a simple collar. It has a set screw **33** which locks the collar into position on the upright tube **1.** The pin **30** and the bolt **32** and the wing nut **26** can be seen clearly in the view of FIGS. **3** and **4.** The purpose of the collar is to locate and lock the position of the bracket assembly **28.** Bracket **29** locks the height of the pulley assembly bracket **28** so that if it is desired to change the position of the pulley assembly bracket **28** by either raising it or lowering it depending upon the size of the person carrying the frame. To make such an adjustment it is necessary to loosen the set screw **33** and raise or lower the collar **29.** The set screw **33** can then be tightened at the desired position. At that particular position, the pulley assembly can be locked into position by meshing the teeth **34** on bracket **29** with the teeth **35** on bracket **28.** The pulley assembly will now be locked and cannot twist on the tube **1.**

In operation, the person takes the straps and places them over his shoulder. He adjusts the buckles **20** so that the straps will fit his size. He locates the pulleys to the position where the straps feel the most comfortable. He then places the bracket **29** on the frame and locks it into position by tightening screw **33.** This is exactly at the location where the pulley assembly **27** is to be located. He then removes the straps and tightens all of the wing bolts **26** into position. If it is more comfortable to have the pulleys facing out because the man has a large stomach, it is only necessary to twist the assembly outwardly from the view shown in FIG. **1** and push down the collar assembly **29** and twist the collar assembly **29** into position so that the teeth **34** and **35** engage and mesh with each other as shown in FIG. **3.** It is then necessary to lock the screw **33** into position so that the pulley assembly will be rigid and secure to the tube **1.**

While it is not shown, it is contemplated that the pulley shaft will be mounted on a bearing.

With adjustable pulleys mounted on the frame, the straps segment **14** are placed over the shoulders and the segment **8** of the strap is placed over the pulleys **6** and around under them and locked to the buckle **20***a*. The strap segments **14** and **8** are then adjusted. Oftentimes, when there is more weight on the frame than is customary, it is necessary to twist the pulleys **6** outwardly or inwardly on the tube **1** until the person finds the most comfortable position. The pulleys **6** prevent the straps **14** from rubbing on the shoulders and causing burns and discomfort. They permit the weight to be evenly distributed over the full length of the straps, giving to the person wearing the pack carrier more comfort. One might analogize this pulley approach to shock absorbers on an automobile since the pulleys are designed to absorb the trauma of weight shifting and jerks as shock absorbers do to bumps.

When the waist belt is tightened, the pulley works as a lever and pushes the load up and off from the top of the shoulders. When the waist belt is tightened, the shoulder straps pull the load snug to the upper part of the back. Since the straps are wrapped around the pulley, they pull the bottom part of the frame upward and snug to the lower part of the back; and, the belt, when tightened at the waist, delivers part of the load onto the legs. The back pack load becomes lighter on the shoulders. The load is more comfortable and easier to carry.

I claim:

1. An improved pack frame assembly to be carried on the back by persons, comprising of: two substantially parallel vertical members, a plurality of horizontal members interconnecting the vertical members at approximately the upper portion, middle portion and bottom portion thereof, a pulley assembly mounted on the outside of each vertical member above the bottom horizontal member, means for adjusting and locking the position of the pulley assembly, a strap assembly including a front belt, means for fastening said strap assembly to the upper horizontal member; said strap assembly adapted to pass over the shoulders of a person carrying the pack frame, underneath the person's armpits, over and under the pulleys and interconnected at the waist in front of the said person carrying the frame.

2. An improved pack frame assembly as described in claim **1** wherein said belt assembly comprises on each side of said frame an upper padded portion, an intermediate strap portion, an adjustable buckle, said buckle connected to said intermediate strap portion and upper padded portion, a clamp means, said clamp means connected to said intermediate strap portion and front belt, and a buckle for connecting each side of the front belt at the waist.

3. An improved pack frame assembly as described in claim **1** wherein said pulley assembly comprises of a pulley bracket adapted to be movably mounted on said pack frame vertical member, said bracket having an adjustable bolt at the top and lower portions thereof for

tightening the bracket to the said frame member, said bracket having a housing portion, an axle mounted within said housing, said pulley mounted on said axle.

4. An improved pack frame assembly as described in claim 2 wherein said pulley assembly comprises of a pulley bracket adapted to be movably mounted on said pack frame vertical member, said bracket having an adjustable bolt at the top and lower portions thereof for tightening the bracket to the said frame member, said bracket having a housing portion, an axle mounted within said housing, said pulley mounted on said axle.

5. An improved pack frame assembly as described in claim 1 wherein said means for locking the position of the pulley assembly comprises a U-shaped bracket fastened about said vertical frame member above the pulley assembly, teeth means on the bottom of said U-shaped bracket, teeth on the top of said pulley assembly designed to mesh with the teeth means on the U-shaped bracket, and a bolt assembly for securing the U-shaped bracket to the vertical frame member.

6. An improved pack frame assembly as described in claim 2 wherein said means for locking the position of the pulley assembly comprises a U-shaped bracket fastened about said vertical frame member above the pulley assembly, teeth means on the bottom of said U-shaped bracket, teeth on the top of said pulley assembly designed to mesh with the teeth means on the U-shaped bracket, and a bolt assembly for securing the U-shaped bracket to the vertical frame member.

7. An improved pack frame assembly as described in claim 3 wherein said means for locking the position of the pulley assembly comprises a U-shaped bracket fastened about said vertical frame member above the pulley assembly, teeth means on the bottom of said U-shaped bracket, teeth on the top of said pulley assembly designed to mesh with the teeth means on the U-shaped bracket, and a bolt assembly for securing the U-shaped bracket to the vertical frame member.

8. An improved pack frame assembly as described in claim 4 wherein said means for locking the position of the pulley assembly comprises a U-shaped bracket fastened about said vertical frame member above the pulley assembly, teeth means on the bottom of said U-shaped bracket, teeth on the top of said pulley assembly designed to mesh with the teeth means on the U-shaped bracket, and a bolt assembly for securing the U-shaped bracket to the vertical frame member.

* * * * *