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Horenstein et al.

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[54] **PACK FRAME WITH RIGID LINK SUSPENSION**

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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, 9, 11

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[57] **ABSTRACT**

A pack frame assembly for carrying a load on a person's back; the assembly comprising a pack frame; an upper suspension comprising a pair of shoulder straps attached to the frame; and a lower suspension on a hip-belt, said lower suspension comprising a pair of down-hanging rigid links, each with upper pivot attachment to said belt, and lower pivot attachment at the lower end of said frame, permitting restricted movement of the frame with each stride of the carrying person.

1 Claim, 3 Drawing Figures

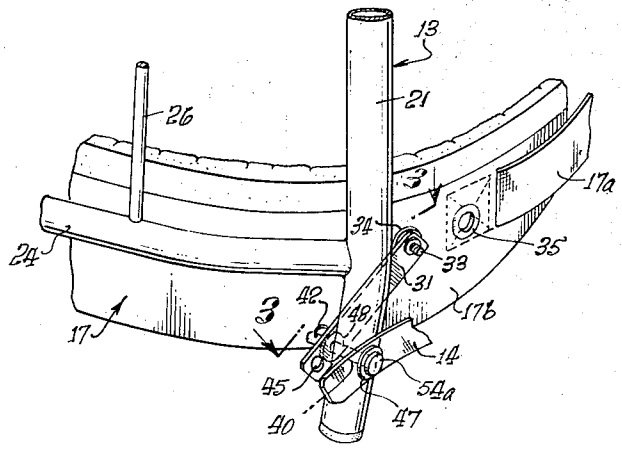


FIG. 1.

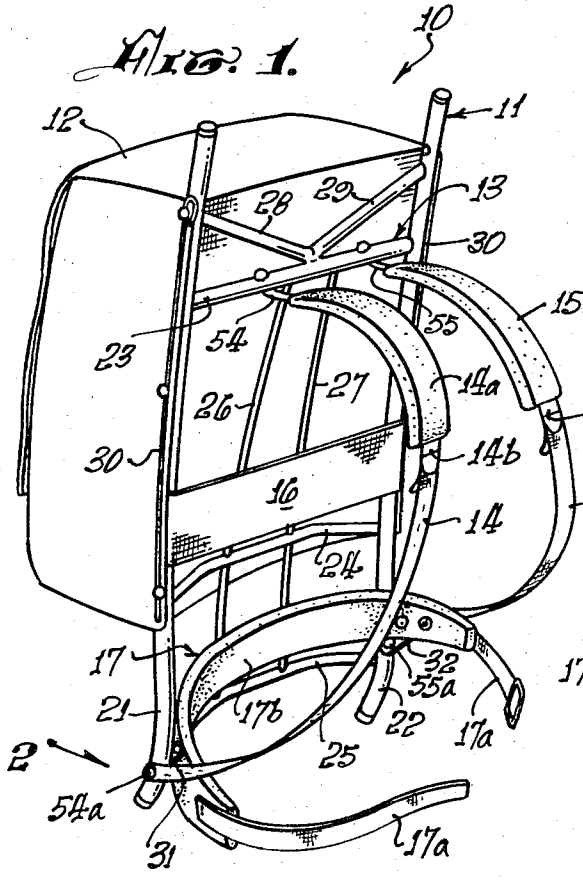


FIG. 3.

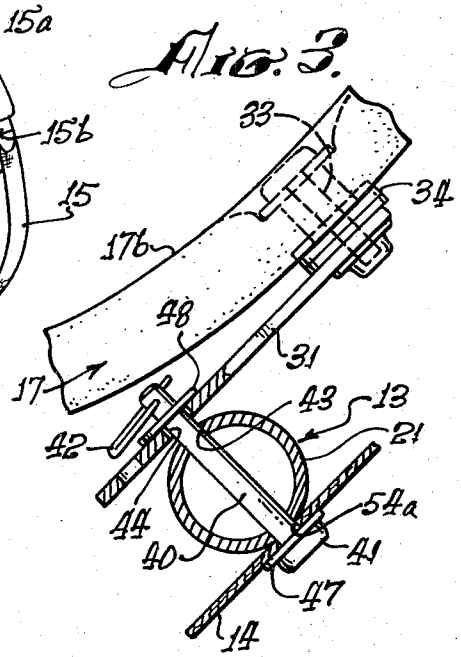
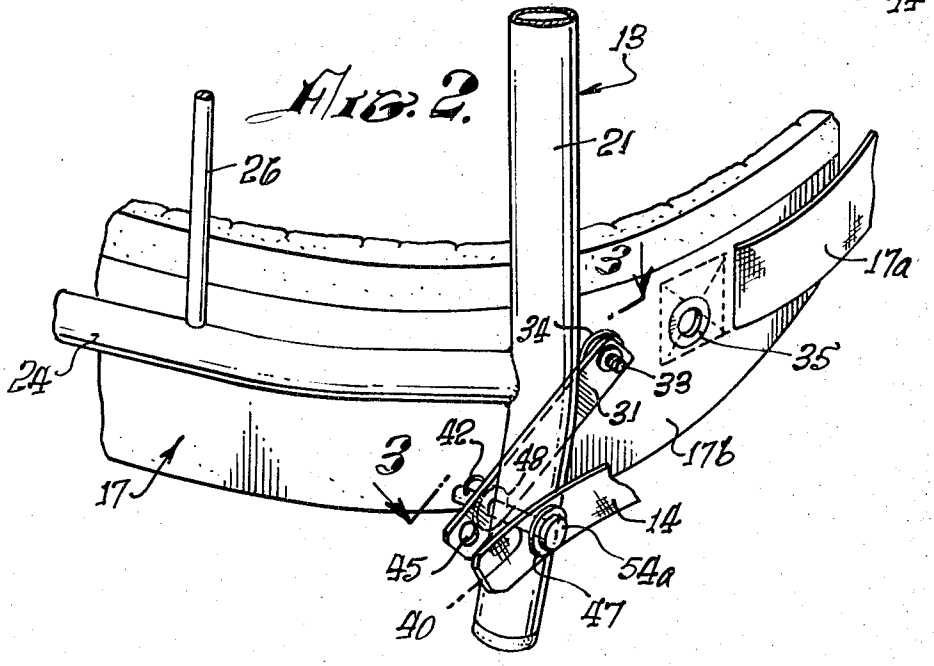


FIG. 2.



PACK FRAME WITH RIGID LINK SUSPENSION

This invention relates generally to a pack frame assembly, and more particularly to a rigid link suspension employed in hanging a pack frame in swinging suspension from a hip-belt.

The sport of back packing has achieved an amazing growth in popularity in recent years, which has, in turn, produced a great increase in production of back packs for hikers, and has also stimulated the development of many improvements in designs of pack frame assemblies for carrying camping equipment.

Many improved designs have been based on the recent discovery that the back pack should be allowed to swing, to a restricted degree, with each stride of the load-carrying person. The hiker can carry his pack for a longer period of time, with less fatigue and greater comfort, if the pack frame assembly on his back is freely movable, within limits, so that his body is not required to jerk the pack through a series of forceful oscillations corresponding to the walking rhythm. The slight swings of the pack reduce the pounding on the hiker's back.

On the other hand, it is important that the swinging movement be not only restricted, but also adjustable to the peculiar characteristics of each hiker. Every person has a slightly different body build, muscle distribution, and stride characteristic. Even the same person may prefer changing the adjustment of his pack frame assembly from time to time, in order to switch the load slightly from one set of muscles to another. In previously known movable back packs, a crude combination of restricted movement and adjustability has been achieved by simply loosening the canvas straps by which it has been customary to tie the lower end of the pack frame to a padded waist belt encircling the waist of the load carrying person. Such flexible straps permit the pack frame to swing in unpredictable manners, not adequately restricted for the needs of comfort of the wearer. Also, adjustability has proven unreliable, since a canvas strap may stretch, or loosen.

The present invention comprises a new form of suspension for suspending the lower end of the pack frame from the waist belt, particularly by using a pair of rigid aluminum links pivotally attached to the waist belt and pack frame at locations which permit the swinging movement required for comfort, but eliminate the erratic and unwanted movement permitted by canvas strap suspension.

The foregoing and other objects of the invention will best be understood from the following description of a preferred specific embodiment of the invention, which embodiment is illustrated in the accompanying drawings in which:

FIG. **1** is a perspective view of a pack frame assembly constructed according to the invention, and carrying a typical back pack load, as seen from a location which would be to the right of and in front of a person carrying the pack of FIG. **1**;

FIG. **2** is a fragmentary perspective view of the lower, rear, right side corner of the pack of FIG. **1**, as seen from a location to the right rear of a person carrying the pack; and

FIG. **3** is an elevational view, partially sectioned, of a rigid link in the right side of the pack of FIGS. **1** and **2**, as viewed in the direction of the arrows **3—3** in FIG. **2**.

In FIG. **1**, the numeral **10** is used to indicate the entire pack, which is comprised of a pack frame assembly, indicated collectively by the numeral **11**, and a pack load indicated by the bag **12** shown mounted to the rear of the pack frame assembly **11**.

The pack frame assembly **11** is comprised of several parts assembled to a typical metal frame **13**, which is best constructed of aluminum or magnesium tubing. It has been standard practice to hang the pack frame **13** from the shoulders of the carrying person (not shown in this illustration) by a pair of shoulder straps **14** and **15**, which are typically provided with rubber or plastic foam padding **14***a* and **15***a* on the parts of their links which place the load of pack **10** in bearing on the shoulders of the carrying person. Another typical part of the pack frame assembly is the stretched canvas back band **16**, which provides a comfortable and yielding contact of the load pack **10** against the back of the carrying person.

A comparatively recent improvement in pack frame assemblies is the padded waist belt **17**, which is constructed of a belt which may be belted onto the waist of the carrying person. Typically such a belt is a construction of canvas webbing straps **17***a* and suitable padding **17***b*, in back and side portions of the belt **17** at which the carrying person feels the load of pack **10**. Pack frame **13** may be of a variety of constructions, including most of those known in the recent past. In the embodiment illustrated, pack frame **13** includes a right side bar **21**, at the right side rear of the carrying person and a left side bar **22**, at the left side rear of the carrying person. Generally, these side bars **21** and **22** are not perfectly straight or perfectly vertical, and are usually slightly contoured in some manner, such as that illustrated in FIG. **1**, to make comfortable conformation to the back of the carrying person. However, for convenience, side bars **21** and **22** will be referred to herein as substantially vertical, and this terminology is intended to include side bars such as **21** and **22**, which depart slightly from the vertical, and which are slightly contoured or angled at one end or throughout their lengths.

Typically, the pack frame includes several horizontal bars across the back of the carrying person. In the illustrated construction, there is a shoulder-level bar **23**, at an elevation slightly below the shoulders of the carrying person. An intermediate bar **24** is formed in concave contour to avoid contact with the back of the carrying person. A bottom hip-level bar **25** is approximately at the elevation of the lower hips of the carrying person, and is likewise of a concave contour.

The frame is strengthened by additional intermediate vertical bars **26** and **27**, and by reinforcing bars such as **28** and **29**.

Side wires **30** are provided as a convenient means for attachment of bag **12** to the frame **13**.

Although shoulder straps **14** and **15** may be attached to frame **13** in a variety of ways, and may themselves be constructed with various constructions, in general they provide suspension of all or a substantial part of the load of pack **10** from the shoulders of the carrying person.

In packs of the type in which the present invention is employed, shoulder straps **14** and **15**, may be referred to collectively as an upper suspension, since a second substantial part of the load is carried by waist belt **17**, through a lower suspension employing a pair of rigid

links, comprising right side link **31** and left side link **32.**

The enlarged perspective view of FIG. **2** shows the manner of assembly of right side link **31** (left side link **32** being attached in the same manner on the left side of the pack **10**). At its upper end, link **31** is pivotally attached to belt **17** by means of a pivot pin **33** received and anchored in a grommet **34.** It will also be seen that the upper pivot attachment by pivot pin **33** may be shifted to another side location **35,** if that provides a better pack movement and pack carriage for the particular person wearing pack **10.** The lower end of link **31** is pivotally attached to the lower inside of substantially vertical side member **21** by means of a lower pivot pin **40,** which has a head **41** and a retainer ring **42** for retaining it in assembly through transverse bore **43** (in side bar **21**) and hole **44** in the lower end of link **31.** A second feature of adjustability in the construction illustrated is provided by having a plurality of pivot attachment holes disposed longitudinally of link **31.** An additional pivot attachment hole **45** is illustrated in the lower end of link **31.** It will be seen that this construction permits varying the swinging links of link **31** between upper pivot attachment **33,** and lower attachment to frame **13** by pin **40.**

It is a preferred form of construction to anchor the lower ends of shoulder straps **14** and **15** at corresponding lower ends of side bars **21** and **22** by the same pivot pin **40,** which connects the lower end of one of the links **31** and **32,** link **31** being illustrated in FIGS. **2** and **3.** Preferably, washers **47** and **48** are employed to provide an extended bearing surface on the adjacent parts of shoulder strap **14** and link **31,** respectively (left side link **32** having the same kind of assembly).

Preferably, shoulder straps **14** and **15** have one or more adjustments which permit shifting the portion of the load carried by upper and lower suspensions, respectively. A simple form of such load-shifting adjustment is simply to change the lengths of the shoulder straps **14** and **15**; for example, this may be accomplished by shortening the straps through buckles **14*b*** and **15*b***. Shortening or adjustment may also be accomplished, however, by changing the location and manner of anchoring of straps **14** and **15** at their upper ends at **54** and **55,** or at their lower ends at **54*a*** and **55*a***. For example, the manner of anchoring at points **54, 55, 54*a***, and **55*a*** may permit of attachment of the respective straps **14** and **15** at different points along their lengths to permit shortening or lengthening of strap distance between the upper and lower anchoring locations. Also, these anchoring points may be constructed to provide a plurality of anchoring locations to pack frame **13,** or in various ways well known to those familiar with the art of pack construction.

I claim:

1. An improved pack frame assembly for movable suspension of a pack load carried on the back of a walking person, said assembly comprising:

a pack frame comprising: substantially vertical right and left side bars disposed behind the shoulders of said person and extending vertically from the region of the shoulders downwards to the hip region of said person; a plurality of transverse members between said side bars, including a lowermost hip-level member, and a shoulder-level member; and side bar ends projecting downwardly and rearwardly from said hip-level member;

an upper suspension comprising a pair of shoulder straps for suspending said pack frame from the shoulders of said person, each of said straps extending from said shoulder-level member to the lower outside of one of said side bar ends;

a lower suspension comprising:

a waist belt encircling the waist of said person;

a pair of rigid links, one near each side of said person, for suspending the lower end of said pack frame from said waist belt, each of said links being provided with

an upper pivot attachment pivotally attaching the upper end of said link to said waist belt at one side of said person; and

a lower pivot attachment for pivotally attaching the lower end of said link to the lower inside surface of the adjacent one of said side bar ends at an elevation below said waist belt, to permit restricted swinging of said pack with respect to said person, during walking.

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