ABSTRACT

A backpacker's device characterized by a frame structure having a central weight-bearing leg which terminates in a lower foot, and two lateral weight-bearing legs, one on either side of the central leg, each terminating in lower ends and connected to the central leg remote from the lower foot and lower ends. In certain embodiments the frame structure is formed of a single bar in a generally M-shaped configuration. The lateral legs of the frame are preferably flexible. Other preferred embodiments include a contoured profile in the frame, a hip belt to which the weight-bearing legs of the frame are attached in a particular relationship, a rigid belt-reinforcing strap to prevent excessive lateral movement of the frame lower ends, and a packbag secured on the frame in a particular relationship.

10 Claims, 6 Drawing Figures
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1 BACKPACKER'S DEVICE

BACKGROUND OF INVENTION

This invention relates to the field of backpacking equipment and in particular to devices by which backpackers can carry loads.

In the field of this invention the ladder or H-type frame to which packbags are mounted has been predominant for many years. Such frames are normally made from rigid hollow bars welded together (or connected together in some other fashion) in the popular ladder or H configuration, which usually includes two parallel vertical members and two or more parallel horizontal cross members. While such pack frames are widely used, there are substantial problems associated therewith.

The ladder or H-type frame was developed years before the development of the sophisticated packbags now popularly used in conjunction with such frames. The ladder frame was developed at a time when it was necessary for a packer to lash articles to his pack frame. Usually the articles he wanted to carry were collected and wrapped in a poncho, ground sheet or shelter sheet to form one or more bundles which were then lashed with cord to the frame for transporting. Since it was of primary importance that none of the packed articles become displaced or lost along the trail, the packer put much emphasis on tying the lashing securely. The frames, therefore, had to withstand forces of considerable magnitude generated by lateral, vertical and/or diagonal lashings. To withstand this, the pack frame had to have substantial rigidity and be strong enough to withstand lashing stresses. The ladder or H-type pack frame configuration provided the necessary rigidity and strength for this purpose.

Since that time, special packbags for use with pack frames have been developed for containment of the articles normally carried by the packer. These bags can be mounted to the frame in such a way that the stresses formerly imposed by lashing have been eliminated or at least reduced and more evenly distributed over the frame. Further, during the same period of time there have been improvements and refinements in the equipment and articles of food carried by the packer which have substantially reduced the weight of the typical load to be carried. A reduction in weight also tends to further reduce the need for rigidity in the frame.

There are certain disadvantages associated with rigidity of pack frames. For example, to provide a frame of substantial rigidity often requires additional weight in the frame structure. A further problem relates to dynamic forces which are applied to the frame, which place a stress on the frame and on the packer. These forces are different from the essentially static forces generated by the aforementioned lashing. These additional forces are applied to the frame through parts of the suspension system used to attach the frame to the packer. Such dynamic forces vary in both direction and intensity with movement of the packer's body during walking and breathing. Being cyclical and repetitive, these forces work to bend the frame repeatedly thus tending to fatigue the metal or other materials used in the frame, ultimately causing structural failure. In frames having welds, holes, sharp bends or rigid joints, the flexing is often concentrated in a way which hastens fatigue, cracking and failure. Therefore, there has been a need for a frame which is capable of supporting a load but has a type or rigidity which would not be susceptible to the destruction caused by these repetitive dynamic forces.

A further significant disadvantage referred to above, is the loss of energy sustained by a backpacker by virtue of the repetitive generation of force which is resisted by the rigid ladder frame. Such energy would preferably be conserved for use in more pleasurable pursuits. Further, in many cases pressures are concentrated on certain areas of the packer's body causing pain or discomfort. Also, the cross pieces used in many ladder frames are in position to bear on the packer's back or spine or shoulders in a way causing discomfort.

BRIEF SUMMARY OF THE INVENTION

The backpacker's device of this invention overcomes the aforementioned problems. The invention is characterized by a unique frame structure having a central weight-bearing leg which terminates in a lower foot, and two lateral weight-bearing legs, one on either side of the central leg, each terminating in lower ends and connected to the central leg remote from the lower foot and lower ends. In certain embodiments the frame structure is formed of a single bar in a generally M-shaped configuration. The lateral legs of the frame are preferably flexible. Other preferred embodiments include a contoured lateral profile in the frame, a hip belt to which the weight-bearing legs of the frame are attached, a particular relationship, a rigid belt-reinforcing strap to prevent excessive lateral movement of the frame lower ends and to help distribute the load around the back of the packer's hips, and a packbag secured on the frame in a particular relationship.

This invention is based in part on the discovery or recognition that significant rigidity in a frame structure is no longer necessary, and indeed, that such excessive rigidity is undesirable. In this inventive frame structure, flexing or bending can be accepted by the weight-bearing legs without substantial resistance, because of the configuration of the frame. Dynamic forces will be distributed over the frame structure, being dispersed and not to cause fatigue or failure. The frame can be allowed to bend to accommodate body movement. The three support points provided by the lower ends of the lateral legs and the lower foot of the central leg are not rigidly connected generally in the upper portion of the frame. At their lower extremities they are free to undergo a degree of relative lateral movement one with respect to the others and may therefore move as needed to accommodate body movement.

The center lift point, or lower foot as it is often referred to herein, may be attached to a padded section of a hip belt in an area to be near, preferably just below, the point where the spine is joined to the pelvis. At this point the lower foot transmits a substantial amount of weight to the pelvis, preferably transferring the weight of the packed load around the back of the pelvic shelf. Such transfer may be facilitated by use of a rigid belt-reinforcing strap which extends across the back of the packer's hips.

The center lift point is very favorably located with relation to the center of gravity of the packed load, particularly in embodiments of this invention in which the upper portions of the aforementioned two support columns are contoured forward toward the packer's shoulders. Since the lower foot lifts from a point nearly directly beneath the center of gravity of the load, the backward pulling of the top portion of the loaded frame...
is minimized, thereby minimizing the forward thrust of the bottom portion of the frame. Further, since the packed load may be centered almost directly over the central lower foot lift point, the load can nearly be in balance over this point, thereby requiring a minimum of forward pulling by the packer through shoulder straps attached to the upper portion of the frame structure. This, of course, provides more comfort to the packer.

In addition to the load-bearing function of the centrally located lift point, the lower foot there of functions to hold the lower part of the frame rearward, countering the forward thrust which occurs as the packed load tends to rotate about the central point of lift.

In the frame structure of this invention, the two lateral legs, on either side of the central leg, also have a load-bearing function. These lateral legs have lower ends which are attached by a flexible connection to a hip belt. Flexibility in the lateral legs provides improved freedom of body movement for the packer and its obvious benefits in a wide variety of activities. The lower ends of the lateral legs are normally flexibly attached to the belt at points forward of the centrally located lower foot. The three lift points, therefore, may be located across and around the back of the pelvis, and provide a superior load-bearing arrangement.

Certain embodiments of the frame of this invention are designed in such a way that two interconnected support columns, which form, for example, the two halves of an M-shaped frame structure, support the pack load well up along the packer's back and over the shoulder area. This not only allows good distribution and equalization of pressure on the packer's body, but provides a convenient attachment point, at the tops of the support columns, for rigid shoulder braces. Such braces provide improved load stability and spacing between frame and back which is advantageous from the standpoint of comfort. The shoulder braces used in preferred embodiment of this invention are the subject of a commonly owned pending patent application of Jerry D. Robertson, Ser. No. 251,054, filed May 8, 1972.

No cross members are needed in the frame structure of this invention. Restriction of head movement or uncomfortable cross-spine contact cannot be a problem in the frame of this invention. In the preferred M-shaped configuration of this invention, four vertical sections of the M structure are located over muscular areas of the torso rather than bony areas, so that a minimum of discomfort results from contact. Further, curvature of the frame forms a concavity to correspond generally to the sometimes convexly curved surface of the human back.

With the foregoing in mind, it is the primary object of this invention to provide a backpacker's device overcoming the aforementioned problems.

Another object of this invention is to provide a pack frame having only the necessary rigidity and having an improved weight-bearing configuration.

Another object of this invention is to provide a backpacker's device having improved comfort in a wide variety of backpacker's activities.

Another object of this invention is to provide a pack frame allowing improved freedom of movement and reducing or eliminating loss of energy caused by work wasted in flexing a rigid frame.

Yet another object of this invention is to provide a pack frame of unique and simple construction, having no welds or other juncture points.

Still another object of this invention is to provide backpacker's equipment including a frame having a primary support point located closely in line with the center gravity of the packer's load.

Another object of this invention is to provide backpacker's equipment including a frame which is designed to transfer weight to the packer's body near the juncture of his spine and pelvis.

Another object of this invention is to provide a pack frame which is much less susceptible to structural failure than the well known ladder type frame.

Another object of this invention is to provide backpacker's equipment overcoming the aforementioned problems which provides a high degree of comfort to the packer.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects will be apparent from the following description of preferred embodiments and from the drawings wherein:

FIG. 1 is a perspective view of a preferred frame structure of this invention.

FIG. 2 is a side elevation of the structure of FIG. 1, showing its indicated position with respect to a packer's back.

FIG. 3 is a back elevation of the device in FIG. 2.

FIG. 4 is a perspective view of a backpacker's device according to this invention. FIG. 5 is a side elevation showing the device of FIG. 4 in position on a backpacker.

FIG. 6 is a view of section 6—6 as indicated in FIG. 3, including, however, only the frame, to illustrate the bearing locations of the three legs.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Throughout the figures, like numerals will be used to indicate like parts.

FIG. 1 is a perspective view of a frame structure which is formed of a single bar which has an M shaped configuration. Bar 12 may be made of a variety of materials. Preferred materials are hollow aluminum stock or hollow magnesium aluminum alloys. Numerous light weight metals are also preferred materials for use in bar 12. In addition to metals, other sufficiently rigid materials would be entirely acceptable. Bar 12 need not be hollow, but may be a solid rod. Bar 12 has a round cross section; however, other cross-sectional shapes are quite acceptable. In determining materials for use in bar 12, consideration may be given to weight, strength and flexibility. Single bar 12 may be formed into the M shaped configuration shown by any of a number of methods, including bending, casting and the like.

Bar 12 has no welds or other connections, since it is made from one piece.

Frame structure includes central leg which is formed of a central portion of bar 12 doubled over. Central leg terminates in a centrally located lower foot, which provides the primary lift point of frame structure. At its upper end lower foot is connected to two lateral weight-bearing legs, one on either side of central leg. Indeed, lateral legs and the upper portions of central leg are integral. Lateral legs terminate in lower ends, which are generally adjacent to lower foot such that both lower
ends 20 and lower foot 16 may be connected to a hip belt as will be explained further herein.

There are no completely rigid connections between lower foot 16 and lower ends 20; the legs extend below any such inter-leg connection. Lateral legs 18 are connected to central leg 14 at a location remote from lower foot 16 and lower ends 20, rendering the lower portions of central leg 14 and lateral legs 18 free to some extent to move fore-and-aft and laterally relative one to the other. Frame structure 10 has a certain rigidity by virtue of the rigidity of single bar 12, however, because of the free-end construction, the lower portions of the three legs of frame structure 10 are not rigidly fixed in position one to the other but may be flexed to provide considerable freedom of movement and eliminate loss of energy caused by excessive working against a rigid frame in normal walking motions. Further, the frame material is such that a degree of "give," or flexing, is available within the length of lateral legs 18 themselves, without regard to the remainder of the frame structure.

Frame structure 10 forms two support columns 22 which are interconnected at lower foot 16. Each of the support columns 22 extend upwardly from lower foot 16 and one of the lower ends 20 and terminate in shoulder-adjacent portions 24. In the embodiments shown, the support columns are formed of a lateral leg and a portion of the central leg. However, with other constructions other structures can form the support columns.

As shown best in FIGS. 2 and 5, frame structure 10 is contoured to conform to the profile of the human back. Shoulder-adjacent portions 24 extend forwardly from the general plane defined by frame structure 10 and lower foot 16 extends rearwardly therefrom. Such a contoured configuration not only conforms to the profile of the human back but allows connection of a packbag to frame structure 10 in a position more nearly directly above the primary support point, which is provided by lower foot 16. This is illustrated best by FIG. 5. Packbag 26 is attached to support columns 22 at shoulder-adjacent portions 24. Such attachment may conveniently be accomplished by the use of inverted pockets 28 which are formed on the surface of packbag 26 in position to receive the tops of shoulder adjacent portions 24. Packbag 26 may be further secured to frame 10 at other points.

A padded hip belt 30, which surrounds the hips of a packer wearing the backpacker's device of this invention, is used as a bearing area for the three weight-bearing legs of frame structure 10 of this invention. Lower foot 16 may be secured to the central portions of hip belt 30 by means of pocket 32 as shown in FIG. 5. Pocket 32, or some other connection or securing means, assures that central leg 14 and its lower foot 16 will remain in a laterally fixed position with respect to the packer's hips, namely, at a position just below the juncture of the packer's spine and pelvis. Lower foot 16 may be free to pivot in pocket 32, about a fore-and-aft axis, to accommodate certain body movements.

Lower ends 20 of lateral legs 18 are joined to hip belt 30 at lateral positions by flexible connecting means 33, which include, rings 31 attached to lower ends 20, straps 34, and D-rings 37 which are sewn to belt 30. Each leg 18 passes through D-ring 37 but retains substantial freedom of movement. Connecting means 33 are of sufficient length to accommodate various body movements of the packer without placing an undue strain on Frame 10. For example, in a forward bending motion, lower ends 20 of lateral legs 18 will tend to separate from hip belt 30. Connecting means 33 are of sufficient length to accommodate such body movement.

A belt-reinforcing strap 35, made of metal or some other rigid material, is sewn in a pocket of hip belt 30 positioning it across the back of the packer's hips and extending across the width of frame structure 10. Strap 35 may be used to prevent excessive squeezing together of lower ends 20, such as can tend to occur with very heavy loads. However, strap 35 does not interfere with the freedom of movement of lateral legs 18 provided by this invention.

As illustrated best in FIGS. 2, 5 and 6, lower ends 20 are in a position forward of the position of lower foot 16. This arrangement tends to distribute the weight around hip-engaging belt 30.

As shown in FIGS. 4 and 5, substantially rigid brace members 36 are coupled to shoulder-adjacent portions 24 of frame structure 10 and extend from frame structure 10 to terminate in free ends 28 which are generally aligned with shoulder-engaging portions 40 of shoulder straps 42. Brace members 36 are made of rigid or semi-rigid material such that they have substantially fixed dimensions between shoulder-engaging portions 24 and free ends 38. Free ends 38 are connected by flexible connectors 34 to the convex upper surfaces 46 of shoulder-engaging portions 40. Shoulder straps 42 have first ends 48 which are connected to frame structure 10 near lower ends 20 and second ends 50 which are secured with respect to frame structure 10 at a level below shoulder-engaging portions 40, through strap 52 which extends from lower foot 16 upwardly to a slide loop 54. Second ends 50 of shoulder straps 42 are joined to the other through slide loop 54 to allow for relative lengthening and shortening of shoulder straps 32 to accommodate various bodily movements.

The arrangement of shoulder straps and brace members used in the preferred embodiments of this invention provide added stability to the load being carried and also provide spacing between frame structure 10 and the back of the packer. Such spacing is desirable to eliminate the discomforts of repetitive contact of back with frame and to provide the advantages of ventilation between back and load.

A wide variety of frame structures may be designed in accordance with this invention. While a single bar is highly preferred for both ease of construction and comfort, other configurations constructed from more than one piece are within the scope of this invention and can be used to obtain the advantages of this invention. Alternative configurations and constructions within the scope of this invention will be obvious to those skilled in the art to whom this invention has been disclosed. The term "frame," as used herein, refers to a device having some rigidity used for mounting a pack bag. The term neither requires nor implies any specific shape or material.

Materials which may be used in producing the various components of the backpacker's device of this invention will be obvious to those skilled in the art to whom this invention has been disclosed. In most cases, such materials will be a matter of choice or convenience.

While in the foregoing specification this invention has been described in relation to certain preferred embodiments, and many details have been set forth for purpose of illustration, it will be apparent to those
skilled in the art that the invention is susceptible to additional embodiments and that certain of the details described herein can be varied considerably without departing from the basic principles of the invention.

I claim:

1. A backpacker's device comprising:
   a frame structure having a central weight-bearing leg terminating in a lower foot, and two substantially flexible lateral weight-bearing legs, one on either side of said central leg, said lateral legs terminating in lower ends and connected to said central leg remote from said lower foot and lower ends whereby said lower foot and lower ends have relative freedom of movement, said frame structure forming interconnected support columns extending upwardly from said lower foot and lower ends and terminating in shoulder-adjacent portions and generally conforming to the profile of the human back; a hip-engaging belt, said lower foot secured thereto in position to be adjacent the juncture of a backpacker's spine and pelvis; and connectors flexibly joining said belt and said lower ends of said lateral legs.

2. The device of claim 1 wherein said frame structure is formed of a single bar, said central leg comprising a central portion of said bar doubled over.

3. The device of claim 1 wherein said shoulder-adjacent portions extend forwardly and said lower foot extends rearwardly.

4. The device of claim 3 wherein said frame structure is formed by a single bar substantially in an M-shaped configuration.

5. The device of claim 1 further comprising:
   flexible shoulder straps adjacent to said frame structure between said lateral legs, said straps having concavo-convex shoulder-engaging portions and having first ends attached to said frame structure near said lower ends of said lateral legs and second ends secured with respect to said frame structure at a level below said shoulder-engaging portions. substantially rigid brace members coupled to said shoulder-adjacent portions of each of said support columns, said brace members extending from said frame structure and terminating in free ends generally aligned with said shoulder-engaging portions of said shoulder straps, said brace member being of substantially fixed dimensions between said shoulder-adjacent portions and said free ends; and means connecting said free ends of said brace members with the convex surfaces of said shoulder-engaging portions of said straps.

6. The device of claim 5 further including a rigid belt-reinforcing strap within said belt in position to extend across the back of the packer's hips.

7. The device of claim 5 further including a pack bag attached to said frame structure at said shoulder-adjacent portions.

8. The device of claim 4 further comprising:
   flexible shoulder straps adjacent to said frame structure between said lateral legs, said straps including concavo-convex shoulder-engaging portions and having first ends attached to said frame structure near said lower ends of said lateral legs and second ends secured with respect to said frame structure at a level below said shoulder-engaging portions; substantially rigid brace members coupled to said shoulder-adjacent portions of said support columns, said brace members extending from said frame structure and terminating in free ends generally aligned with said shoulder-engaging portions of said shoulder straps, said brace member being of substantially fixed dimensions between said shoulder-adjacent portions and said free ends; and means connecting said free ends of said brace members with the convex surfaces of said shoulder-engaging portions of said straps.

9. The device of claim 1 further comprising a rigid belt-reinforcing strap within said belt in position to extend across the back of the packer's hips.

10. The device of claim 7 further including a pack bag attached to said frame structure at said shoulder-adjacent portions.