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Mead et al.

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[54] **ADJUSTABLE FIT PACK FRAME**

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

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

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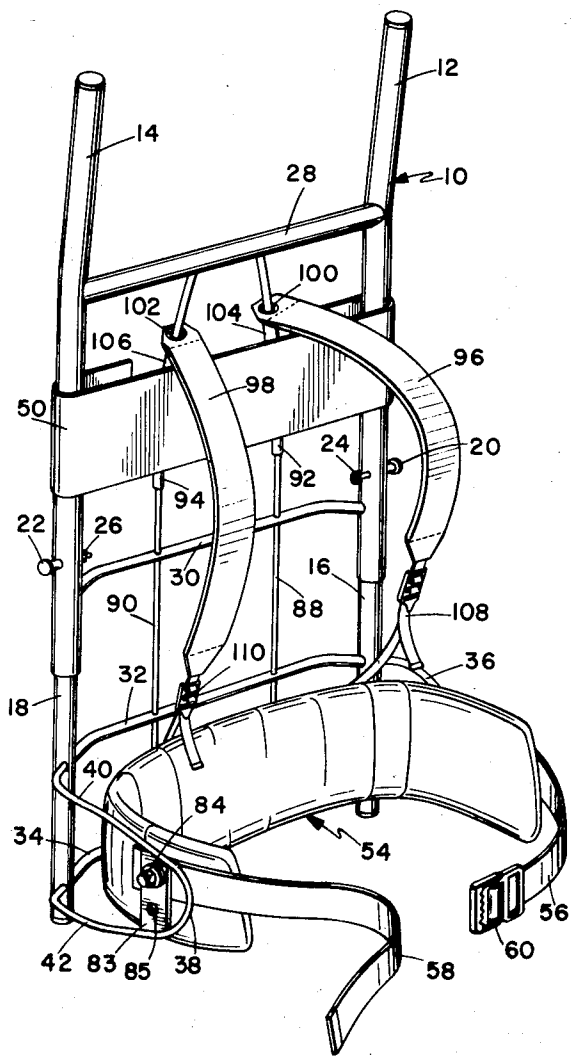
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[57] **ABSTRACT**

A pack frame that is adjustable in length to position the shoulder bar, upper back band, and side arms of the device in the appropriate spaced relationship to fit a particular user. The length adjustment includes telescoping tubes for the main side rails and the central structural rods of the device. Adjustment is also provided for the space between the side arms and the angle of the side arms. Finally, adjustment is provided in the load transfer point for the upper portions of the shoulder straps. The shoulder straps are free to move at their upper point, to seek the proper position. The shoulder straps are secured to the central rod by oversized grommets.

7 Claims, 4 Drawing Figures



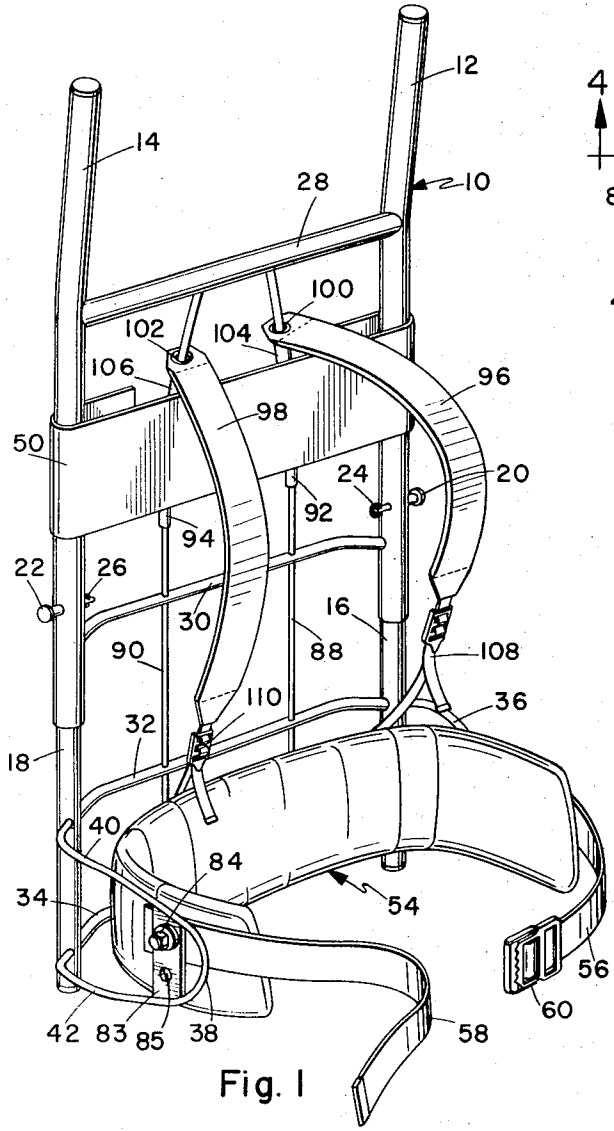


Fig. 1

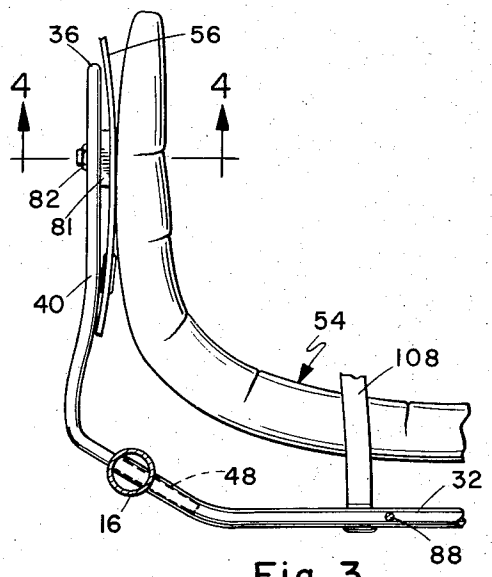


Fig. 3

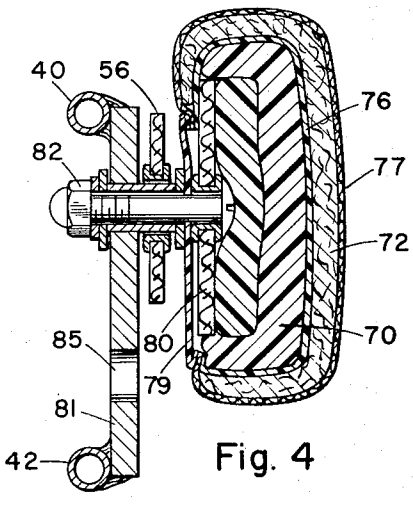


Fig. 4

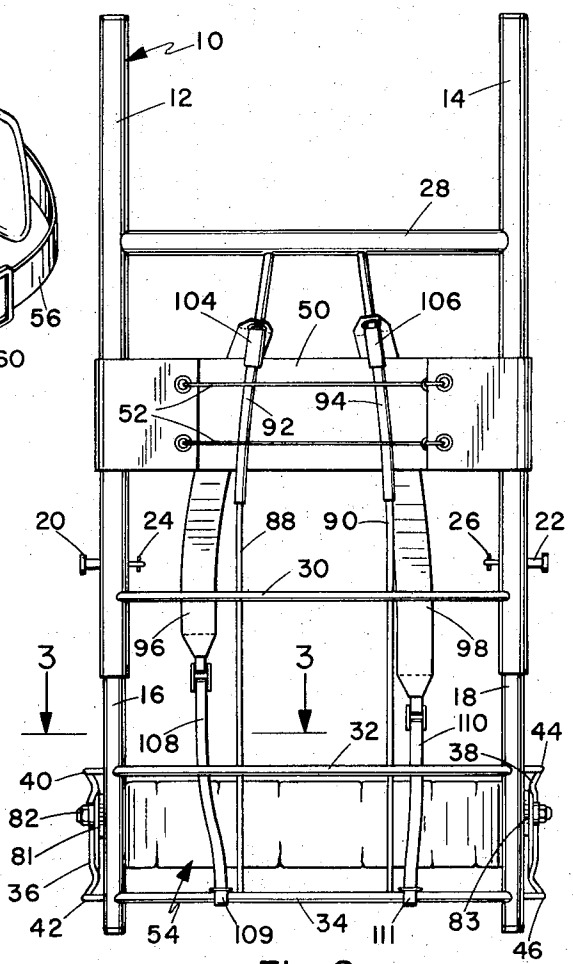


Fig. 2

ADJUSTABLE FIT PACK FRAME

It has long been recognized that the "fit" of a pack frame is extremely important to the comfort of the user. That is, the pack frame must be sized correctly for a particular user, to transfer weight to the user at the appropriate places on his frame and to balance the load properly in relationship to the user's center of gravity. Obtaining such a fit from an existing pack frame has been a matter of trial and error. Many individuals with undersized or outsized shapes could not be satisfactorily fitted by any available pack frame. Poorly fitted pack frames do not place the load properly over the user's center of gravity, and result in an excessive pull on the shoulder straps. The result is an uncomfortable walking position and abrasion from the straps.

Thus, it is desirable to have a new and improved pack frame design that provides for sufficient adjustment in the overall length of the pack frame, as well as the particular attachment point to the user's body, such that substantially all users, despite their shape or size, may be properly fitted to the frame. Such a pack frame is particularly desirable where the contact points with the user were padded and arranged to minimize abrasive contact.

SUMMARY OF THE INVENTION

An exemplary embodiment of the invention incorporates a pack frame having telescoping side rails, as well as central rod members, that allow for longitudinal adjustment. The side rails may be telescoped to extend or retract the distance between the side arms and shoulder bar. The side rails may be retained in any selected position. By this adjustment, the proper space relationship between the side arms, and its associated hip hugging pad, from the shoulder bar and its associated upper back band, may be established. In this manner, the load will be carried as high on the user as is desirable, and the cushioning of the back band will be provided at the appropriate place. The vertical adjustment is accommodated, and the effectiveness of the shoulder straps are accentuated by the design of the invention, whereby the upper ends of the shoulder strap have a selected amount of vertical adjustment. In the exemplary embodiment, the vertical adjustment is accomplished by securing the shoulder straps on the central bars by oversize grommets. The oversized grommets allow the upper end of the shoulder strap to seek its appropriate vertical position. Once stabilized in this position, it will not move significantly under load.

Adjustment is also provided for in the lower back band or hip hugger pad. The overall width of the user is compensated by the side arms being bent until the appropriate width is attained. Various lengths of lower back bands compensate for the users width.

It is therefore an object of the invention to provide a new and improved adjustable fit pack frame.

It is another object of the invention to provide a new and improved adjustable pack frame that is adjustable in overall height.

It is another object of the invention to provide a new and improved adjustable pack frame that accommodates a variety of width and shapes of users.

It is another object of the invention to provide a new and improved pack frame that accommodates vertical adjustment in the upper ends of the shoulder strap.

It is another object of the invention to provide a new and improved adjustable pack frame that is relatively low in cost.

It is another object of the invention to provide a new and improved adjustable pack frame that does not add significantly to the weight of the structure nor reduce its overall strength.

Other objects and many attendant advantages of the invention will become more apparent upon a reading of the following detailed description, together with the drawings, in which like reference numerals refer to like parts throughout and in which:

FIG. **1** is a perspective view of the pack frame of the invention.

FIG. **2** is a planar view of the pack frame taken from the back side thereof.

FIG. **3** is an elevational view taken along lines **3—3** of FIG. **2.**

FIG. **4** is a sectional view of the back pad of the invention taken along lines **4—4** of FIG. **3.**

Referring most particularly to FIGS. **2** and **3,** the adjustable pack frame of the invention is illustrated to comprise a frame portion **10,** including side rails **12** and **14.** The structural cross members on the frame include a shoulder bar **28,** and tubular horizontal frame members **30, 32,** and **34.** A pair of side arms **36** and **38** are mounted at the lower end of the frame, and carry between them a padded back band or hip hugger **54.**

The main side rail members **12** and **14** are bent, substantially at the location of the shoulder rail. The purpose of this bend is to cause the highest portion of the load to be carried toward the center of gravity of the user. The horizontal cross members of the pack frame are utilized for rigidizing and adding structural strength to the pack frame and also to accommodate the free ends of the side arm **36** and **38.** Each of the cross members **30, 32** and **34** is bent adjacent to each end, to position the cross members and the vertical rod members away from the plane of the frame as defined by the shoulder bar and side rails. This spacing prevents any contact between the load and the user's back or other body portion. A fabric upper back band **50** is secured across the upper front portion of the frame below cross bar **28,** and is held tightly stretched around the side members **12** and **14** by tie cords **52.** The structural members of the pack frame in the instant embodiment are primarily of aluminum tubular and rod construction. However, any high strength, low weight, material could also be employed within the scope of the invention.

Referring to the pack frame details illustrated in FIGS. **1** and **2** in more detail, the horizontal cross members, are received within bores in the vertical side rails. The shoulder bar is secured to the vertical rails by surface welding. The side rails **12** and **14** also receive the lower side rail telescoping portions **16** and **18.** These are received within the upper side rails, and positioned in the upper side rails by a pair of clevis pins **20** and **22.** The clevis pins are received through the upper side rail members and through a selected bore, of a plurality of vertically spaced bores, in the lower side rail telescoping members. In this manner, by removal of the clevis pins **20** and **22,** the overall length of the pack frame may be adjusted to substantially any desired length, and the desired length retained by reinserting the clevis pins **20** and **22** in the appropriate bore in the lower telescoping members. After proper adjustment is established,

the clevis pins **20** and **22** are retained in position by the use of retainers **24** and **26.** The telescoping action of the main side rail members is accommodated by the central rod members **88** and **90** by their being slidably received through cross member **30,** and telescopically received within slip tubes **92** and **94.** Since the overall length of the frame is fixed by the clevis pins **20** and **22,** the slip tubes need not have any provision for fixing the adjustment and accommodate the central rod members in a frictional slipping engagement. The slip tubes are received in the shoulder rail, at a lesser spaced-apart distance than the spaced apart distance for the lower portions of the vertical rod members in the cross member **34.** This spacing permits the slip tubes to serve as attachment structure for the shoulder straps as will be more fully described hereinafter.

The side arm configuration illustrated in FIGS. **1** and **3** includes a generally U-shaped member of a bendable heavy wall tubing or rod material **36** and **38.** This side arm material is of an alloy which maintains enough rigidity and spring to not bend in normal use yet which allows bending to alter width between the side arms. Side arm **36** is typical and includes an upper rod portion **40** and lower rod portion **42.** Side arm **38** comprises upper rod portion **44** and lower rod portion **46.** Referring to FIG. **3,** the terminal portion **48** of the upper rod portion **40** is received through the lower telescoping side rail member **16** and into the inner diameter of the cross member **32.** Thus, the side arms are received within the cross member slidably and are frictionally held in position by forcing the upper and lower rod portions into the curved portions of the cross members **32** and **34.** Vertical attachment members **81** and **83** are provided between the upper and lower guide members of the side arms **36** and **38,** respectively, and may include adjustment holes such as hole **85,** to accommodate vertical adjustment of the pack attachment. The strap attachment **56** is illustrated as being secured by a bolt and nut **82** to the vertical attachment member **81.** The strap **56** is secured to its corresponding vertical attachment member by a nut and bolt **84.** A buckle **60** is provided to secure the free ends of the strap around the user.

Referring most particularly to FIGS. **1** and **2,** there is illustrated a pair of padded shoulder straps **96** and **98** with adjustable lower strap portions **108** and **110.** The lower strap portions are secured to the horizontal bar **34** at **109** and **111.** The padded straps **96** and **98** are secured, through grommets **100** and **102,** to the slip tubes **92** and **94.** The upper straps are free to slide along the slip tubes as determined on the tensioning on the shoulder straps. The position of the upper straps stabilizes under load because the primary load transferred by the straps is carried through the lower strap portions **108** and **110** and the upper straps are substantially horizontal. Friction between the grommets **100** and **102** and the slip tubes holds them in position, so they do not shift unnecessarily. A pair of sleeves **104** and **106** is received over the slip tubes and frictionally engages thereon, to limit the vertical travel of the shoulder straps, so that the upper end of the shoulder straps do not slide down the slip tubes an excessive distance when the frame is resting on the ground.

The upper portion of the shoulder straps and the lower back band or hip hugger, are of a padded construction that contributes importantly to the functioning of the invention. The design of this padded construction is most apparent from the illustration in FIG. **4.** A first pad layer **70** is comprised of a locked cell foam material. By utilizing locked cell foam, the cushioning effect is insured. This type of foam cannot crush flat and retains a progressively stiffer cushioning effect as it is compressed. The padding is doubled in the area of the attaching bolt. A second pad layer **72** is provided. The material incorporated in layer **72** is a Dacron fiber material and absorbs moisture, in addition to providing padding. The moisture absorption characteristic is important to the comfort to the user, in that excessive moisture accumulating on the skin will cause shaffing and other discomfort. The padded layers are separated by fabric material **76,** and are surrounded by additional layers **77** and **79** of this material. These materials are primarily protective in nature. The loads carried through the back band and/or shoulder straps, are transferred to a belt webbing **80,** or substantially the same material as the waist belt **58** and **56.** Incorporating the belt within the back band, rather than utilizing a continuous waist belt, avoids the tangling and twisting that is otherwise experienced when utilizing a unitary belt.

OPERATION

In use, the pack frame of the invention is adjusted to the particular user to rest on and transfer the load, to the user's anatomy in the most comfortable fashion possible.

The first adjustment is to bend the side arms in width until they will allow the lower back band to come to rest in the proper location below the waist.

The second adjustment is to set the spacing between the lower back band **54** and the shoulder bar. The spacing desired, is that which will place the shoulder bar slightly above the shoulders of the user, at the same time that the hip hugger, or lower back band is resting on the user's hips and buttocks. In this operation, the hip hugger is placed over the user's hips, so that the side arm portions of the back band cover the hip bone, and the rear portion of the back band rests on top of the shelf of the buttocks. The pins **20** and **22** are unlocked from retainers **24** and **26** and removed from the telescoping tubes, whereupon the upper portion of the frame is raised or lowered to properly position the shoulder bar. With this bar in its most desired position, the pins **20** and **22** are inserted in the closest bore through the lower side rail tube **18** and **16,** and the retainers **24** and **26** again fastened. With the shoulder bar properly located, the upper back band will be against the shoulder blades. This keeps any other part of the frmae from being in contact with user's back. On conventional pack frames with lower bands similar to the upper back band **50,** the lower back band does not necessarily conform to the user's back. Often the load is carried only on the leading edge of these lower back bands. In the instant invention, the use of side arms moves the carry point forward to the user's midpoint. This forces the back portion of the hip hugger to tip up until it conforms with the users back, thus distributing the load over its full surface.

The other adjustments including the tightness of the waistband and the shoulder straps are made by the user and are varied from time to time to achieve maximum effect. With the pack frame on the user's back and a load in place, the upper portions of the shoulder straps **96** and **98** will seek a position along slip tubes **92** and

94, to produce the optimum adjustment of the angular relationship of the shoulder to the shoulder strap, without further attention from the user.

Having described our invention, we now claim.

1. An adjustable pack frame for transferring the weight of a pack to a user comprising,

a plurality of vertical frame members including adjustment means for selectively varying the length of said vertical frame members,

said vertical frame members comprise two side rails and at least one vertical frame rod disposed between said side rails,

said adjustment means for said side rails comprises upper and lower side rails,

one of said side rails being telescopically received in the other of said side rails,

means for retaining said upper and lower side rails in a selected telescoped position,

a plurality of horizontal frame members connecting said vertical frame members at spaced intervals,

a pair of opposed side arms secured to said frame and carrying a padded back band between said opposed side arms,

a plurality of shoulder straps, each having a first end connected to the lower portion of said frame and a second end mounted for free sliding movement parallel to said vertical frame members,

said shoulder straps automatically adjust the changing load conditions so that substantially no vertical load is carried through said shoulder straps and substantially all of the load is carried by said back band.

2. The adjustable pack frame of claim 1 further including,

a waist belt comprising separable belt sections,

and one end of each of said belt sections being secured to said side arms.

3. The adjustable pack frame of claim 1 wherein,

said adjustment means for said vertical frame rod comprises a tube telescopically receiving said rod.

4. The adjustable pack frame of claim 1 wherein,

at least two of said vertical frame rods are received telescopically in tubes on opposite sides of the center line of said frame,

and shoulder straps having grommets at their upper ends received over said tubes.

5. The adjustable pack frame of claim 1 including,

at least two horizontal frame members comprising tubular members,

said side arms comprising generally U-shaped rods,

and the ends of said rods being received through said vertical frame members and into said tubular horizontal frame members.

6. The adjustable pack frame of claim 5 wherein,

said side arms are bendable to vary their orientation from said frame.

7. The adjustable pack frame of claim 1 wherein,

said back band comprises a layered padded belt incorporating a layer of locked cell foam material, an absorbent layer, and an uncoated fabric protective layer to allow passage of perspiration to the absorbed layer.

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