

July 12, 1949.

J. MILLER ET AL
PARACHUTE HARNESS

2,475,631

Filed Dec. 29, 1945

4 Sheets-Sheet 1

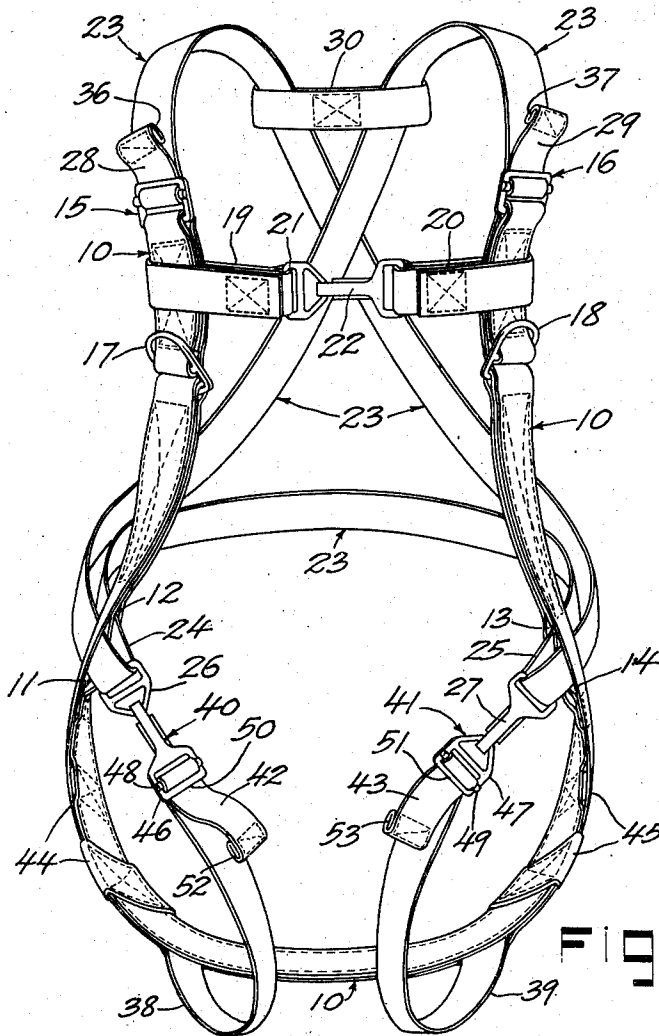


Fig. 1

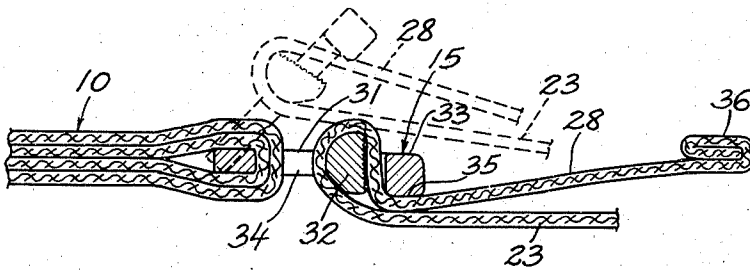


Fig. 2

INVENTORS
JOSHUA MILLER
BERGIE L. KAUFFMAN
JAMES T. TRULSEN
BY *M. Hayes*
ATTORNEY

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4 Sheets-Sheet 2

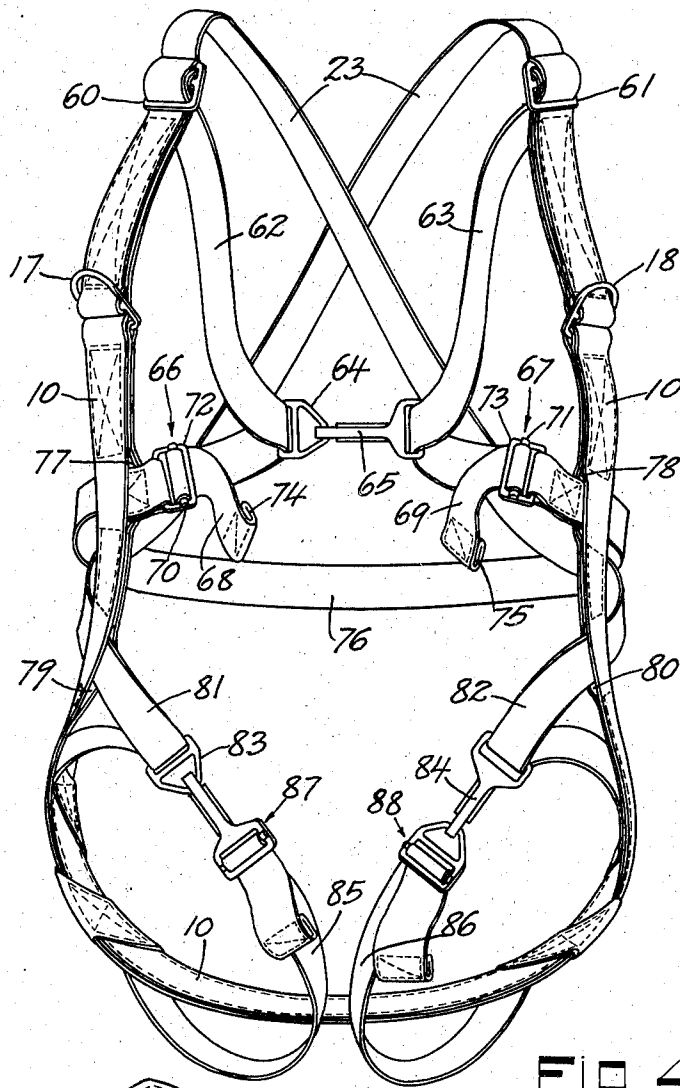


Fig. 4.

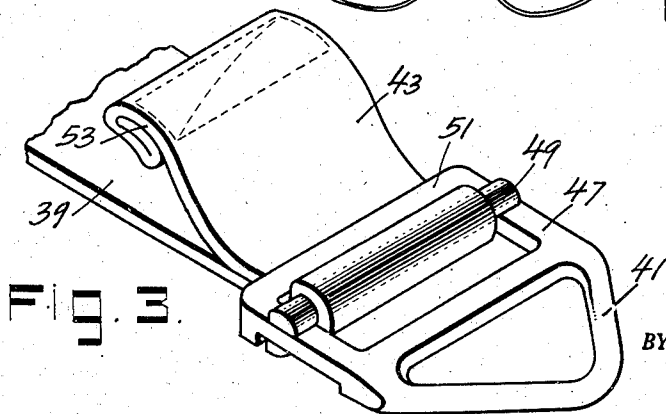


Fig. 3.

INVENTORS
JOSHUA MILLER
BERGIE L. KAUFFMAN
JAMES T. TRUELSEN
BY *McKayes*
ATTORNEY

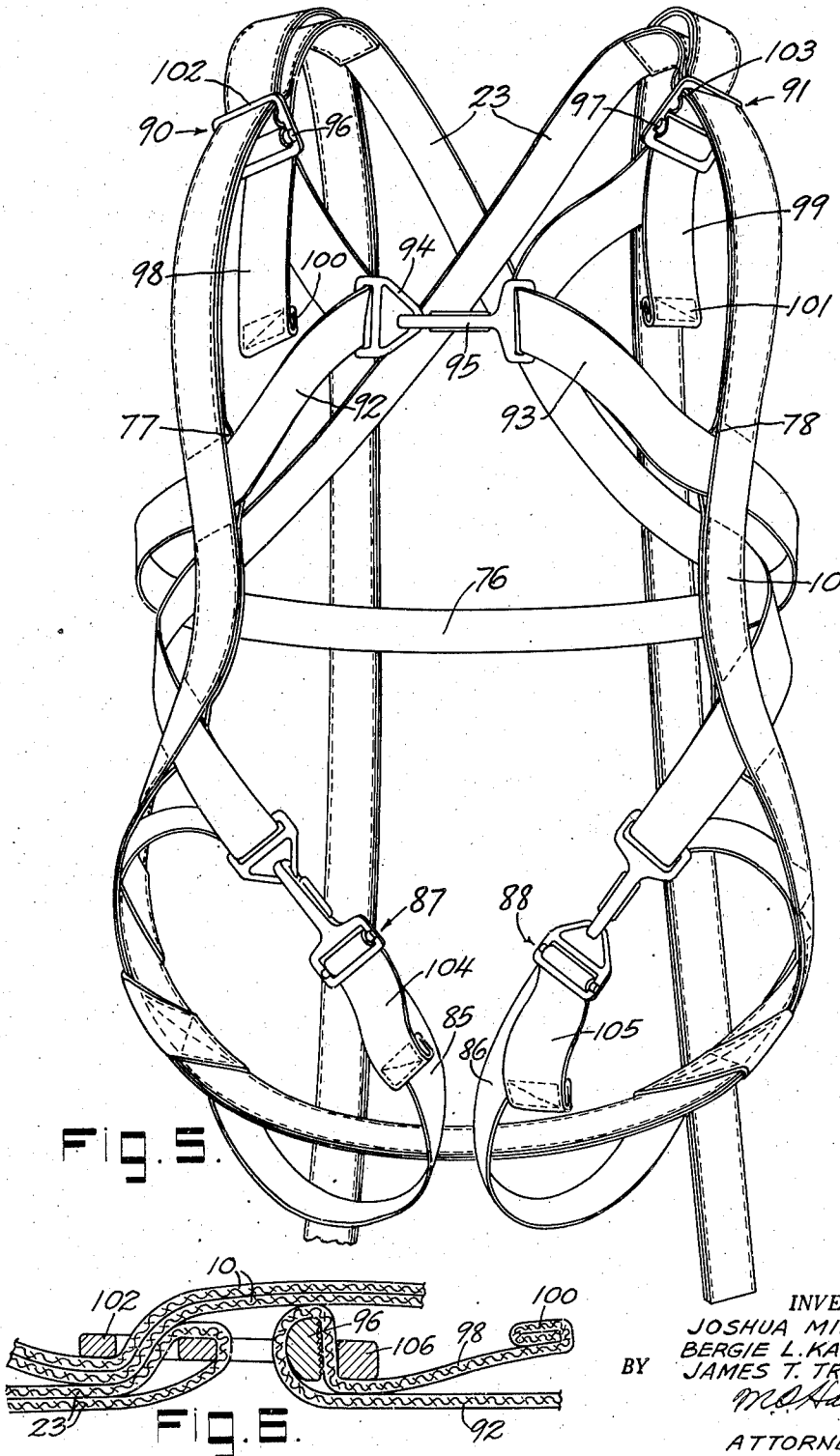
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PARACHUTE HARNESS

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4 Sheets-Sheet 3



INVENTORS
JOSHUA MILLER
BERGIE L. KAUFFMAN
JAMES T. TRUELSEN
BY
M. Hayes
ATTORNEY

July 12, 1949.

J. MILLER ET AL
PARACHUTE HARNESS

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4 Sheets-Sheet 4

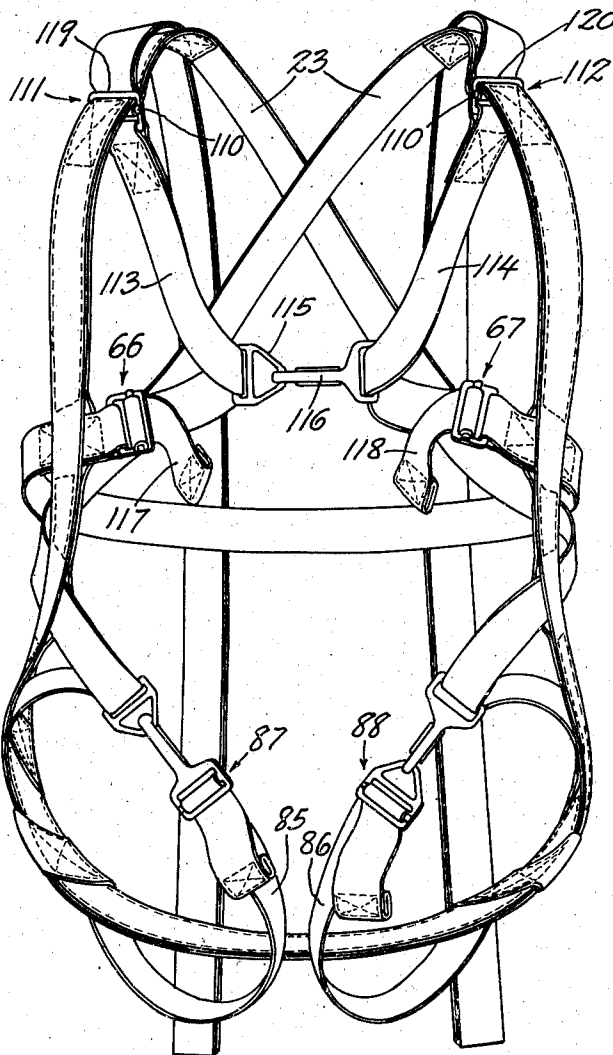


Fig. 7.

INVENTORS
JOSHUA MILLER
BERGIE L. KAUFFMAN
BY JAMES T. TRUELSEN
McHayer
ATTORNEY

UNITED STATES PATENT OFFICE

2,475,631

PARACHUTE HARNESS

Joshua Miller, Drexel Hill, Pa., Bergie L. Kauffman, Collingswood, N. J., and James T. Truelssen, Philadelphia, Pa.

Application December 29, 1945, Serial No. 637,812

21 Claims. (Cl. 244-151)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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Our invention relates to parachute harnesses and particularly to constructions whereby such harnesses may be quickly and easily adjusted to fit wearers of different size and may be arranged to provide greater safety and comfort for the wearer.

It has been usual heretofore to provide parachute harnesses with adapters for varying the effective length of the leg straps and body engaging straps so that a standard harness may be adjusted to fit different wearers. However, prior adapters have not been capable of quick and easy adjustment while the harness is in place on the wearer and it is almost impossible to adjust the straps at all when they are all connected in wearing position. Moreover, since it generally required from ten to fifteen minutes even for an expert to adjust the harness properly it is usual to tack the straps of the harness together after they have once been adjusted in order to be sure that they will always be arranged to fit a particular wearer. The same harness therefore is seldom suited for use by different wearers and it is not feasible to provide a harness which is left in the seat of an airplane to be worn by any pilot or passenger who may use the aircraft.

It is also usual for wearers to arrange the harness so that it fits sufficiently loosely about the legs and body to render it comfortable when they are standing or walking about or during long flights. As a result, when the parachute is actually used the seat strap frequently slips up rearwardly from beneath the wearer's seat drawing the leg straps into the crotch in a manner which is most uncomfortable and may even injure the wearer. In the alternative pilots and passengers often unsnap the fasteners of the harness which otherwise hold them rigid or stiff and interferes with mobility and therefore it is necessary to rebuckle the harness before jumping and there are therefore delays and danger of improper connection of the harness in emergency.

Efforts have been made to overcome this difficulty by permitting the webbing to slip when under load so as to tighten the harness on the wearer, but this does not assure proper positioning of the straps on the wearer and subjects the wearer to severe abrasion and cramping when the straps are drawn up forcibly upon shock loading of the parachute.

In accordance with our invention these objections to harnesses of the prior art are overcome by providing a novel type of adjustment for parachute harnesses whereby they can be fitted to anyone in a matter of a few seconds and can be

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loosened or tightened easily and quickly while fully connected so that the wearer is under no restraint while walking or moving about, but can draw the harness instantly into position to hold the seat strap securely in place beneath his seat and about his body without the delays necessary to insure safety and comfort when fastening and using prior parachute harnesses.

These advantages are attained when using our invention by providing adjusting means on the straps of the harness which are freely movable to shorten the straps but positively prevent lengthening or loosening of the straps when they are placed under tension. On the other hand, the adjusting means may be manipulated easily to release the straps and loosen the harness without disconnecting the straps or removing the harness from the wearer.

One of the objects of our invention is to provide a parachute harness which is quickly and easily adjusted to fit wearers of different size.

Another object of our invention is to provide a parachute harness with means for adjusting the straps thereof while they are connected in place on a wearer.

A further object of our invention is to provide a parachute harness which affords greater safety and comfort for the wearer.

These and other objects and features of our invention will appear from the following description thereof in which reference is made to the figures of the accompanying drawing.

In the drawing:

Fig. 1 is a perspective of one typical form of parachute harness embodying our invention;

Fig. 2 is a longitudinal sectional view through one form of adjuster device embodied in the harness of Fig. 1;

Fig. 3 is a perspective of an alternative form of adjuster device embodied in the harness of Fig. 1;

Fig. 4 is a perspective of an alternative form of harness embodying our invention;

Fig. 5 is a perspective of a further alternative type of harness embodying our invention;

Fig. 6 is a longitudinal sectional view through one of the adjuster devices embodied in the harness of Fig. 5; and

Fig. 7 is a perspective of another form of harness embodying our invention.

Referring to the drawings, and more particularly to Fig. 1 thereof, the parachute harness itself may be similar to those heretofore employed in that it comprises a main web 10 which passes under the seat and up the front of the wearer to the shoulders, the portion under the seat being

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the mid-portion of the entire web 10. The web 10 may be given adequate strength by forming the same of a plurality of identical webs stitched together at their side edges and elsewhere as shown. At two points, the edges of the webs are not stitched together, thereby forming adjacent pairs of passageways 11 and 12, and 13 and 14, in opposite sides of the web 10, respectively, through which other webs or straps of the harness may be passed as hereinafter described.

In the shoulder areas at opposite sides of the wearer, the main web 10 is reeved through adjuster devices 15 and 16, respectively, in the manner shown most clearly in Fig. 2, and then is folded downwardly upon itself and suitably secured to the underlying portion thereof and to rings 17 and 18, respectively, which are also secured to the underlying portions of the web 10. The rings 17 and 18 are provided for attaching to the harness a chest parachute of suitable design.

Loosely mounted upon the main web 10 at opposite sides of the front of the wearer and intermediate the adjuster devices 15 and 16 and the rings 17 and 18, are strap loops 19 and 20, respectively, that are adapted to extend inwardly across the chest of the wearer. Secured to the inner ends of the strap loops 19 and 20 are a ring 21 and hook fastener 22, respectively, arranged for interlocking connection with one another in the manner illustrated in Fig. 1.

In addition to the main web 10 which supports the weight of the wearer when descending by means of a parachute attached to rings 17 and 18, auxiliary webs are provided for the purpose of preventing the wearer from falling out of the main supporting web 10 particularly during the shock or jolt that occurs when the parachute opens. Thus, as shown in Fig. 1 of the drawing, a suitable back strap assembly 23 is provided which passes horizontally across the back of the wearer and then forwardly about the right and left hand sides through the previously mentioned passageways 12 and 13, respectively, in the main web 10. After passing through the passageways 12 and 13, the back strap 23 forms side loop portions 24 and 25 which pass through a ring 26 and hook fastener 27, respectively, and then double back through the passages 11 and 14 in the main web 10, thence around the right and left hand sides of the wearer from where they extend upwardly, crossing over behind the back, and then pass forwardly over the opposite shoulders where the end portions 28 and 29 thereof are adjustably connected to the aforesaid adjuster devices 15 and 16, respectively. The portions of the back strap assembly 23 that cross over behind the back of the wearer and forwardly over the opposite shoulders may be provided with an interconnecting loop strap 30 loosely mounted thereon for the purpose of preventing the shoulder portions of the strap from slipping laterally off the shoulders.

The adjuster devices 15 and 16 illustrated are similar to those described in the copending application of Miller and Truelsen, Serial No. 603,998, filed July 9, 1945, and are of identical construction, although other devices which permit the straps to be freely moved in shortening the straps but positively prevent slipping of the straps when placed under tension may be used. Each of the adjusting devices shown comprise a rectangular or square open frame 31 having associated therewith a friction grip member 32 which is disposed parallel to the frame end portion 33 and slidably mounted upon the side por-

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tions 34 of said frame 31. It is to be noted that the end portion 33 of the adjuster frame 31 is relatively thicker than other portions thereof to provide an offset or projecting portion beyond the general plane of the adjuster devices at the underside thereof as indicated at 35.

The end portions 28 and 29 of the back strap assembly 23 are adjustably connected to the adjuster devices 15 and 16, respectively, substantially as shown in Fig. 2, the said end portions each being passed beneath the frame end portion 35 and friction members 32 of said adjuster device, upwardly through the frame 31 between the other frame end portion thereof and said friction member 32 and then doubled back over said friction member 32, reversely through the frame 31 and outwardly beneath the frame end portion 33 so that the respective end portions of the back strap assembly 23 are relatively free and positioned so as to be readily accessible to the wearer. The free ends of the back strap assembly may be folded upon themselves once or twice and stitched to provide stops 36 and 37, respectively, of sufficient size to prevent complete disengagement of the ends of the strap 23 from the adjuster devices 15 and 16, respectively, all as clearly shown in the drawing.

In addition to the back strap assembly 23, leg straps 38 and 39 having a hook fastener 40 and ring 41, respectively, adjustable on their end portions 42 and 43, as hereinafter described, are wound around, through, and stitched to the main web 10 as indicated generally at 44 and 45, respectively. The leg straps 38 and 39 are adapted to pass forwardly between the legs of the wearer and then upwardly over the abdomen of the wearer for interconnection of the hook fastener 40 and ring 41 thereon with the ring 26 and hook fastener 27, respectively, on the side loop portions 24 and 25 formed by the back strap assembly 23.

As stated, the fastener 40 and ring 41 are adjustably secured upon the free end portions 42 and 43 of the leg straps 38 and 39 respectively, and in accordance with the present invention, this is accomplished by providing novel hook fastener and ring constructions generally similar to the adjuster devices 15 and 16, previously described. The ring fastener is shown in perspective in Fig. 3. However, both the fastener 40 and ring 41 comprise rectangular or square open frames 46 and 47, respectively, each having associated therewith a friction member 48 and 49, which is slidably mounted on the side portions of said frames for movement therealong. It is to be borne in mind that, as in the case of the adjuster devices 15 and 16, the frame end portions 50 and 51 are relatively thicker than the remainder of the frames and arranged to provide offset or projecting portions at the underside of said frames, the same as the portions 35 of the adjuster devices 15 and 16 previously described.

The end portions of the leg straps 38 and 39 are passed through the frames 46 and 47 respectively of the fastener 40 and ring 41 substantially in the same manner as shown in Figs. 2 and 3 of the drawing, the said end portions 42 and 43 of the straps being passed first beneath the frame end portions 50 and 51 and the slidable friction members 48 and 49, respectively, and then outwardly through the eyes of said frames 46 and 47, back over said friction members, then inwardly through the eyes of said frames and outwardly beneath the frame end portions 50 and 51, respectively, so that the ends 42 and 43 of

said straps are free and in positions readily accessible to the wearer. The ends of the straps 38 and 39 are folded upon themselves once or twice and stitched to provide stops 52 and 53, respectively, of sufficient size to prevent disengagement of the strap end portions from the fastener 40 and ring 41, respectively.

It is pointed out that the length of the leg straps 38 and 39, and the length of the back strap assembly 23, are sufficient to provide for adjustment of the positions of the fastener 40, ring 41 and adjuster devices 15 and 16, respectively, on said straps as, and to the extent, required to fit the harness properly upon persons of all sizes.

The harness shown in Fig. 1 is fastened to the wearer by snapping the hooks 22, 27 and 40 on the rings 21, 41 and 26, respectively, in the manner and relation illustrated. Before fastening the hooks onto the rings, the end portions 28 and 29 of the back strap assembly 23 are adjusted with respect to the adjuster devices 15 and 16, and the end portions 42 and 43 of the leg straps 38 and 39 are adjusted with respect to the fastener 40 and ring 41, respectively, to provide sufficient slack in the respective straps to enable the several rings and hooks to be readily and easily fastened together by the wearer. The amount of slack required in the several straps, of course, is dependent upon the size of the particular wearer and, as hereinbefore stated, the straps have a length sufficient to provide for adjustment to meet the requirements of persons of all sizes.

After the hooks and rings have been fastened together as described, the slack in the leg and back straps is taken up, and the harness properly tightened and fitted upon the wearer, merely by the wearer selectively grasping the free end portions 42, 43, 28 and 29, of said straps and pulling the same through the associated adjusters, hook and ring. Such adjustment can be effected quickly and easily by inexperienced persons. Moreover, since the straps are connected together when tightened the shortening of one strap serves in effect to shorten both of the connected straps at the same time and to produce a balance and fitting of the harness which is not possible when they are adjusted separately. Thus, for example, by pulling the free end 43 of the leg strap 39 downward while ring 41 is connected to the hook fastener 27 on strap loop 25, the seat portion 10 of the harness is drawn forward beneath the wearer's seat while the straps 23 are tightened about the wearer's side and back to hold the harness in place so that a proper fit is established and safety and comfort are assured.

As the straps are thus tightened, the tension thereon causes the friction member 32 of the adjuster 15 and corresponding members of the hook or ring, as the case may be, to be urged forcibly toward the frame end portion 33 with increasing force so as to clamp the straps firmly therebetween with the result that the straps are securely and tightly held in the positions to which adjusted. Slippage of the straps under load cannot occur since the greater the tension or pull upon the straps, the tighter will be the clamping or gripping action of the gripping members of the adjusters 15 and 16, the hook 40 and ring 41, respectively, on the straps to prevent slippage or displacement thereof. For this reason the construction and arrangement of the adjusters 15 and 16, hook 40 and ring 41 is such that, once tightened, the straps associated therewith

will not work loose accidentally, or on continued moving about of the wearer and on the other hand they will not draw up or tighten on the wearer under shock loading of the parachute. Therefore, safety and comfort are assured where-as abrasion of the straps against the wearer due to slippage of the straps cannot occur.

After the harness has been donned and adjusted as described the wearer is able to loosen the chest and leg straps for greater comfort without unfastening the hooks and rings. This may be accomplished easily by lifting the frame end portion 33 from the full line position to the dotted line position of Fig. 2. When thus raised the tension on the strap 23 urges the friction member 32 against the side frame members 31 rather than toward the end frame portion 33. The strap end 28 then tends to straighten out and in so doing causes the friction member to move away or back off from the end frame portion 33 so as to release the straps and permit them to slide freely through the adjuster.

Loosened in this manner, the harness may again be worn comfortably but can be readily and easily re-tightened to fit properly merely by pulling upon the free end portions of the chest and leg straps in the manner previously described.

While a particular embodiment of the present invention has been illustrated and described in Figs. 1, 2 and 3 the invention is by no means limited to such disclosure since it may be embodied in substantially any type of harness. Thus, as illustrated in Fig. 4 the upper portions of the main web 10 may be reeved through fixed adapters of conventional type as shown at 60 and 61 and are then folded down upon themselves and suitably attached to the underlying portions of the main web and to the rings 17 and 18 provided for receiving a chest parachute pack of suitable design. The upper portions of back straps 23 also extend through the fixed adapters 60 and 61 and include portions 62 and 63 which continue forward over the wearer's chest to provide the loops which carry a ring 64 and snap hook 65 respectively. From the ring and snap hook the straps 62 and 63 pass to the slip adjusters 66 and 67 which preferably are essentially the same as those shown at 15 and 16 in Figs. 1 and 2. The free ends 68 and 69 of the straps 62 and 63 extend through the central opening in the frames of the adjusters and over the friction members 70 and 71 respectively and then pass back beneath the enlarged end frame portions 72 and 73. The extremities of the straps may be folded once or twice to form the end stops 74 and 75 for preventing the ends of the straps from slipping out of the adapters when the harness is loosened.

The slip adjusters 66 and 67 are themselves connected to the opposite ends of a back strap 76 which extend forward through openings 77 and 78 formed by the omission of stitching in the main web 10.

The lower portions of the back straps 23 extend forward at opposite sides of the wearer through openings 79 and 80 in the main web 10 to form loops 81 and 82 which carry a ring 83 and a snap hook 84 respectively. The straps pass from the ring and snap hook to the seat portion of the main web 10 where they are secured by stitching. However, the ends of these straps are extended to form the leg straps 85 and 86 which have slip adjusters 87 and 88 provided with hook 89 and ring 90 respectively for connection with the ring 83 and hook 84. The construction and

operation of the leg straps 85 and 86 and slip adjusters 87 and 88 is substantially the same as in that form of our invention illustrated in Fig. 1 whereby the leg straps and back straps are simultaneously fitted to the wearer. However, the harness shown in Fig. 4 affords adjustment of the loops 64 and 65 which extend across the chest and thus provides for greater comfort and safety in some instances and on some wearers.

In that form of our invention illustrated in Figs. 5 and 6 the harness is very similar to that shown in Fig. 4 but instead of using the fixed adapters 60 and 61 of Fig. 4 the back straps 23 are connected to slip adjusters 90 and 91 as shown in Fig. 6. The back strap 76 is extended forward through the openings 77 and 78 in the main web 10 and forms the loops 92 and 93 carrying a ring 94 and a snap hook 95 respectively. The ends of the back strap pass from the ring and hook to the slip adjusters 90 and 91 respectively where they are threaded through the central opening in the frame of the adjuster and then over the friction members 96 and 97 and out beneath the thickened frame end portions as illustrated in Fig. 6. The free ends 98 and 99 of the straps are doubled upon themselves once or twice to provide the stops 100 and 101.

The main web 10 of the harness shown in Fig. 5 are freely slidable through eyes 102 and 103 in the slip adjusters 90 and 91 and pass rearwardly from the adjusters over the wearer's shoulders to a back or seat pack (not shown).

With this construction the harness is drawn up to fit the wearer by pulling downward on the free ends 104 and 105 of the leg straps 85 and 86 by which slip adjusters 87 and 88 are carried and by pulling downward on the free ends 98 and 99 of the straps extending from the slip adjusters 90 and 91. At the same time the harness may be loosened readily to provide comfort by simply raising the thickened end portion 106 of the adjuster frame as in the construction shown in Fig. 2.

The construction shown in Fig. 7 is similar to that shown in Fig. 4 but the back straps 23 are fixedly secured to the central bars 110 of fittings 111 and 112 while separate straps 113 and 114 are attached to the lower end bars of the fittings and take the place of the strap portions 62 and 63 of Fig. 4 so as to form loops which extend over the wearer's chest and carry the ring 115 and the snap hook 116 respectively. The free ends 117 and 118 of the straps 113 and 114 extend through the slip adjusters 66 and 67 for tightening the harness on the wearer.

The main webs 10 of the harness pass beneath the upper end bars 119 and 120 of the fittings 111 and 112 and extend rearwardly over the wearer's shoulder to a back pack or seat pack not shown.

The leg straps 85 and 86 carry the slip adjusters 87 and 88 and cooperate with the slip adjusters 66 and 67 to insure proper fitting of the harness by quick and easy operations while permitting the desired looseness for comfort and ready connection of the hook and ring or other securing members employed in the combination.

From the foregoing description it will be apparent that substantially any type of parachute harness may be constructed and arranged to embody the present invention and may be manufactured in a single size. At the same time it can be quickly and easily donned and adjusted to fit properly by inexperienced personnel regardless of his or her size and either before or after boarding a plane and whether in a stand-

ing or sitting position. Moreover, on shortening one strap while connected to another the harness fits itself automatically to the wearer throughout substantially the entire harness thereby bringing the elements into balanced relation. In particular, when used in that type of harness wherein the main web is in the form of a sling having a seat portion by which leg straps are carried and extend upward between the legs for attachment to body engaging straps, the invention may be arranged so that shortening of the leg straps (or body straps to which the leg straps are connected) serves to draw the seat strap forward beneath the wearer and at the same time decreases the effective length of the connected straps so that the seat strap will not slip out rearwardly from beneath the wearer and his safety and comfort during shock loading of the parachute canopy and under other conditions of use are assured.

The invention also provides a parachute harness which may be loosened by the wearer for greater comfort without unfastening the leg or chest straps and which in any emergency may be substantially instantaneously tightened and properly fitted preparatory to jumping. The invention further provides a parachute harness wherein the possibility of injury by pinching or abrasion due to slippage of the straps on shock loading of the parachute is substantially eliminated. The construction and fitting of the harness is thus greatly simplified and is entirely safe and fool-proof in use.

The various alternative forms of our invention shown and described above are designed to show typical ways in which the elements of the combination may be constructed and arranged so as to adapt the invention to different types of parachute harness. However, other forms and types of harness may be employed and the shape, size and location of the slip connectors may be varied considerably and will suggest themselves to those skilled in the art. In view thereof it should be understood that the forms of our invention herein shown and described are intended to be illustrative only and are not intended to limit the scope of our invention.

The invention described herein may be manufactured by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

We claim:

1. Parachute harness comprising a main web having a portion arranged to pass beneath the seat of a wearer and portions arranged to extend upward in front of a wearer toward the shoulders, leg straps connected to the seat portion of the main web, body engaging straps connected to the upwardly extending portions of the main web and movable with respect thereto in adjusting the harness to fit a wearer, separable connectors carried by the leg straps and body engaging straps to hold the harness in place on the wearer, said leg straps and body engaging straps each having a free end portion located in position to be readily grasped by a wearer, and means for varying the effective length of the connected leg straps and body engaging straps including slip adjusters carried by said straps and each having an element engageable by the free end of one of said straps and movable thereby to hold the straps in fixed position when placed under tension in a direction to increase the effective length thereof, said element being movable

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to release the straps for adjusting movement when the straps are not under such tension.

2. Parachute harness comprising a main web having a portion arranged to pass beneath the seat of a wearer and portions arranged to extend upward in front of a wearer toward the shoulders, leg straps connected to the seat portion of the main web, body engaging straps connected to the upwardly extending portions of the main web and movable with respect thereto in adjusting the harness to fit a wearer, separable connectors carried by the leg straps and body engaging straps to hold the harness in place on the wearer, other separable connectors carried by body engaging straps which are arranged to extend across a wearer's chest, said leg straps and body engaging straps each having a free end positioned to be located in front of a wearer, and means for varying the effective length of the connected straps to fit the harness to a wearer, including slip adjusters carried by said straps and each having an element engageable by the free end of one of said straps and movable thereby to hold the straps in fixed positions when placed under tension in a direction to increase the effective length thereof, said element being movable to release the straps for adjustment when not under such tension.

3. A harness comprising a main web arranged to pass under the seat of the wearer, thence up the front and terminating at the shoulders, adjuster devices secured to the terminal ends of said main web in the forward shoulder region at opposite sides of the wearer, means to attach a parachute to said main web, means carried by said main web to interconnect the terminal portions thereof across the chest of the wearer, a back strap arranged to extend horizontally across the back and forwardly about the right and left hand sides of the wearer through openings in the main web to form side loops, said back strap then passing reversely through other openings in said main web thence around the right and left sides of the wearer, upwardly crossing over behind the back, then forwardly over the opposite shoulders and having portions thereof adjustably secured respectively to said adjuster devices, leg straps having one end thereof secured to said main web and arranged to extend forwardly between the legs and upwardly over the abdomen of the wearer, a ring and a hook respectively on said side loop portions of the back strap, and a hook and a ring adjustably mounted respectively on the free end portions of the leg straps and arranged for interlocking connection respectively with the ring and hook on said side loop portions of the back strap to secure the harness upon the wearer at the legs.

4. A parachute harness comprising a main web arranged to pass under the seat of the wearer, thence up the front, to the shoulders, fittings on said main web arranged for positioning respectively in the forward shoulder regions at opposite sides of the wearer, said main web passing upwardly through said fittings and then reversely therethrough downwardly over and secured to the upward courses of said web, rings attached to said web portions at opposite sides of the chest of the wearer for attachment of a parachute pack, a back strap arranged to extend horizontally across the back and forwardly about the right and left sides of the wearer through openings in the main web at the front of the wearer adjuster devices permanently secured respectively to the forward ends of said back strap, leg and chest

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straps secured adjacent their lower ends to the main web and extending upwardly therefrom to form side loops, said leg and chest straps then passing through openings in said main web, thence around the right and left sides respectively of the wearer, crossing over behind the back, then forwardly over the opposite shoulders, through said fittings and downwardly over the front of the wearer to form chest loops with the other end portions thereof adjustably connected respectively to said adjuster devices secured to said back strap, complementary fastening devices on said chest loop portions of the leg and chest straps arranged for interlocking connection to secure the harness upon the wearer at the chest, a ring and a hook respectively on said side loop portions of the leg and chest straps, and a hook and a ring adjustably mounted respectively on the lower free end portions of said leg and chest straps and arranged for interlocking connection respectively with the ring and hook on the said side loop portions to secure the harness upon the wearer at the legs.

5. A parachute harness comprising a main web arranged to pass under the seat of the wearer, thence up the front, over the shoulder, and terminating in a pair of lift webs passing down the back for connection to a parachute pack, a pair of adjuster devices on said main web arranged for positioning respectively, in the forward shoulder regions at opposite sides of the wearer, a back and chest strap arranged to extend horizontally across the back and forwardly about the right and left hand sides of the wearer to form chest loops and having its opposite end portions adjustably connected respectively to said adjuster devices, complementary fastening devices on said chest loop portions of the back and chest strap arranged for interlocking connection to secure the harness upon the wearer at the chest, leg straps secured adjacent their lower ends to said main web and extending upwardly therefrom to form side loops, said leg straps then passing around the right and left sides respectively of the wearer, crossing over behind the back, then forwardly over the opposite shoulders and having the upper end portions thereof permanently secured respectively to said adjuster devices, a ring and a hook respectively on said side loop portions of the leg straps, and a hook and a ring adjustably mounted respectively on the free end portions of said leg straps and arranged for interlocking connection respectively with the ring and hook on the said side loop portion of the leg straps to secure the harness upon the wearer at the legs.

6. A parachute harness having a main web, body engaging straps connected to said main web and having portions movable with respect to the main web and positioned to extend about a wearer's body, leg straps each connected at one end to said main web and positioned to be drawn upward between a wearer's legs, complementary fittings carried by said portions of the body engaging straps and by said leg straps for connecting said leg straps to the body engaging straps in applying the harness to a wearer, and slip adjusting means carried by each of the leg straps, the opposite ends of said leg straps being free and extending from said slip adjusting means in position to be grasped by a wearer and pulled to reduce the effective length of the connected body and leg straps while the harness is in place on a wearer, with said fittings in connection relation, said slip adjusting means each including an element engageable by said free end of a leg strap

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and movable thereby to hold the straps in fixed positions when placed under tension in a direction to increase the effective length of the connected body and leg straps, said element being movable when said free end of the leg strap is pulled to permit relatively free movement of said free end to tighten the harness on a wearer.

7. A parachute harness having a main web, body engaging straps connected at their opposite ends to said main web and having intermediate portions movable with respect to the main web and positioned to extend about a wearer's body, leg straps each connected at one end to said main web and positioned to be drawn upward between a wearer's legs, complementary fittings carried by the intermediate portions of said body engaging straps and by said leg straps for connecting said straps in applying the harness to a wearer, and slip adjusting means carried by the leg straps, the opposite ends of said leg straps extending through said adjusting means and presenting free ends located in position to be grasped and pulled by a person wearing the harness to reduce the effective length of said leg straps whereby adjustment in the length of the straps will serve to vary the effective length of the connected leg and body straps, said slip adjusting means each including an element engageable by said free end of a leg strap and movable thereby to hold the straps in fixed positions when placed under tension in a direction to increase the effective length of the connected body and leg straps, said element being movable when said free end of the leg strap is pulled to permit relatively free movement of said free end to tighten the harness on a wearer.

8. In a parachute harness embodying a seat sling, leg straps connected to said seat sling, body engaging straps also connected to said sling, and connectors carried by the leg straps and body engaging straps for releasably connecting said straps together, means for simultaneously varying the effective length of the leg and body straps while these straps are connected and while the harness is in place to adjust the harness to fit wearers of different size, said means including a fitting formed with an opening therein through which a free end portion of one of said straps extends into position to be grasped and pulled by a person wearing the harness, to tighten the harness, and a gripping member engaged by said free end portion and movable thereby with respect to said fitting to strap releasing and strap holding positions, movement of said free end portion in a direction to tighten the harness on the wearer tending to move the gripping member to strap releasing position whereby the leg straps and body engaging straps may be connected and thereafter simultaneously tightened by pulling on said free end portion, movement of said free end portion in a direction to loosen said harness tending to move the gripping member to said strap holding position to prevent undesired loosening of said straps.

9. A parachute harness of the character defined in claim 8 wherein a plurality of said fittings are employed and each fitting is carried by a different strap.

10. A parachute harness of the character defined in claim 8 wherein one of said fittings is carried by each of the leg straps.

11. A parachute harness comprising a U-shaped sling arranged to pass beneath the seat of a wearer and upward at opposite sides of a wearer to points adjacent each of the wearer's shoulders, leg engaging strap means connected to said sling

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in position to be drawn upward between a wearer's legs, a body engaging strap connected to said sling at one of said points adjacent a wearer's shoulder, a second body engaging strap connected to said sling at the other of said points adjacent a wearer's shoulder, means for detachably connecting said body engaging straps to each other and to said leg engaging strap means, said leg engaging strap means and said body engaging straps each presenting a free end portion, and means for adjusting the harness to fit wearers of different size including fittings each formed with an opening therein through which one of said free end portions extends, each fitting having a gripping member engaged by the free end portion extending therethrough and movable by said free end portion with respect to said fitting to strap releasing and strap holding positions, movement of said free end portion in a direction to tighten the harness on the wearer tending to move the gripping member to strap releasing position and movement of said free end portion in a direction to loosen the harness tending to move the gripping member to said strap holding position.

12. A parachute harness comprising a main web in the form of a U-shaped sling with a portion arranged to extend beneath a wearer's seat for supporting the wearer during a parachute descent and having side portions extending upward from said seat portion, a back strap extending across the harness between the upwardly extending side portions of said sling and having the opposite ends thereof extending forwardly from the sling, an adjusting member carried by each of said forwardly extending ends of the back strap, two chest straps each of which is connected at a point adjacent wearer's shoulder to one of the upwardly extending side portions of said sling and extends downward from said point in a loop and is provided with a connector for securing said loops together, the lower portion of each of said chest straps passing through one of the adjusting members on the ends of said back strap and terminating in a free end located in front of the wearer in position to be grasped by the wearer so that when the end is pulled it will tighten the chest and back straps simultaneously.

13. A parachute harness comprising a main web in the form of a U-shaped sling having a portion arranged to extend beneath the seat of a wearer for supporting the wearer during a parachute descent and having side portions extending upward from said seat portions at opposite sides of the wearer, a back strap of fixed length extending between the upwardly extending side portions of said sling and having the opposite ends thereof extending forwardly from the sling, an adjusting member carried by each of said forwardly extending ends of the back strap, two chest straps each of which is connected at a point adjacent the wearer's shoulder to one of the upwardly extending side portions of said sling and extends downward from said point in a loop and is provided with a connector for securing said loops together, the lower portion of each of said chest straps passing through one of the adjusting members on the ends of said back strap and terminating in a free end located in front of the wearer in position to be grasped by the wearer so that when the end is pulled it will tighten the chest and back straps simultaneously, said adjusting members each including a gripping element engaged by the free end portion of the shoulder strap and movable thereby to prevent free move-

ment of the shoulder strap to increase the effective length thereof.

14. A parachute harness comprising a main web arranged to pass under the seat of the wearer, thence up the front, over the shoulder, and terminating in a pair of lift webs passing down the back for connection to a parachute pack; fittings on said main web arranged for positioning respectively in the forward shoulder regions at opposite sides of the wearer; a back strap arranged to extend horizontally across the back and having its opposite ends protruding forwardly about the right and left hand sides to the front of the wearer; adjuster devices permanently secured respectively to the forward ends of said back strap; two chest straps each having one end thereof which extends through one of said adjuster devices and terminates in a free end located in front of the wearer in position to be grasped in adjusting the harness; said chest straps extending upwardly from said adjuster devices to form chest loops and having their other end portions permanently secured respectively to said shoulder fittings; complementary fastening devices on said chest loops arranged for interlocking connection to secure the harness upon the wearer at the chest; body straps secured adjacent their upper ends to said main web and extending downward therefrom to form side loops located adjacent the hips of the wearer, a ring and a hook respectively on said side loop portions of the body straps; leg straps connected to said main web in positions to extend upward between the wearer's legs and each terminating in a free end portion, a hook and a ring adjustably mounted respectively on the free end portions of said leg straps and arranged for interlocking connection respectively with the ring and hook on the said side loop portions of the body straps to secure the harness upon the wearer at the legs.

15. A parachute harness having a sling arranged to pass beneath a wearer's seat and upward at opposite sides of the wearer to points adjacent the wearer's shoulders, chest straps connected to the sling at said points and extending downward therefrom over the wearer's chest, back straps connected to said sling at said points and extending downward therefrom across the wearer's back and provided with forwardly extending loops at opposite sides of the wearer, leg straps connected to the sling at the seat and arranged to extend upward between a wearer's legs, means for detachably connecting said chest straps to each other, means for detachably connecting said leg straps to said loops, said leg straps and said chest straps each having a free end portion positioned to be located in front of a wearer when the straps are connected, and a separate fitting located adjacent each of said free end portions, each of said fittings having an end portion and a friction member about which said free end portion passes, the friction member being movable by said strap portion toward said end portion of the fitting to cooperate with said end portion of the fitting in holding the strap portion against slippage, movement of the free end portion in a direction to loosen the harness tending to move the friction member to a strap holding position and movement of the free end portion in a direction to tighten the harness tending to move the friction member to strap releasing position.

16. A parachute harness comprising a main web in the form of a U-shaped sling for supporting a wearer during a parachute descent, leg straps

each having one end thereof connected to said main web, the opposite ends of the straps being arranged to extend upward between the legs of a wearer in applying the harness, body engaging straps connected at their opposite ends to said main web and having intermediate portions in the form of loops extending forward at opposite sides of the wearer, said loops being provided with connecting members, said leg straps having complementary connecting members thereon engageable with the connecting members on said loops, and adjusting members formed integral with the connecting members on the leg straps, the leg straps having free end portions passing through the adjusting members and extending therefrom in position to be grasped and pulled through the adjuster while the connecting members are in engagement whereby a reduction in the effective length of the leg straps will serve to produce a simultaneous and similar tightening of the body engaging straps to adjust the harness to fit the wearer while the harness is in place, said adjusting members each including a gripping element engaged by the free end portion of the leg strap and operable to prevent free movement of the leg strap to increase the effective length thereof.

17. A parachute harness comprising a main web arranged to pass under the seat of the wearer, thence up the front, over the shoulder, and terminating in a pair of lift webs passing down the back for connection to a parachute pack; a pair of adjuster devices on said main web arranged for positioning respectively in the forward shoulder regions at opposite sides of the wearer; a back and chest strap arranged to extend horizontally across the back and forwardly about the right and left hand sides of the wearer to form chest loops and having its opposite end portions adjustably connected respectively to said adjuster devices; complementary fastening devices on said chest loop portion of the back and chest strap arranged for interlocking connection to secure the harness upon the wearer at the chest; leg straps formed independently of the back and chest strap and having free ends provided with adjusters for varying the effective length of said free ends, the opposite lower ends of said leg straps being secured to said main web and extending upwardly therefrom to form side loops; said leg straps then passing around the right and left sides respectively of the wearer, crossing over behind the back, then forwardly over the opposite shoulders and having the upper end portions thereof permanently secured respectively to said adjuster devices; a ring and a hook respectively on said side loop portions of the leg straps; and a hook and a ring adjustably mounted respectively on the free end portions of said leg straps and arranged for interlocking connection respectively with the ring and hook on the said side loop portion of the leg straps to secure the harness upon the wearer at the legs; the said adjuster devices, said hook and said ring being constructed and arranged so that the respective end portions of the straps associated therewith are adjustable with respect thereto at the will of the wearer so that when the straps are placed under tension to tighten the same about the body of the wearer said adjuster devices, hook and ring operate to securely retain said straps in the positions to which adjusted.

18. A parachute harness comprising a main web arranged to pass under the seat of the wearer, thence up the front, over the shoulder,

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and terminating in a pair of lift webs passing down the back for connection to a parachute pack; a pair of adjusting devices on said main web arranged for positioning respectively in the forward shoulder regions at opposite sides of the wearer; a back and chest strap arranged to extend horizontally across the back and forwardly about the right and left hand sides of the wearer to form chest loops and having its opposite end portions adjustably connected respectively to said adjuster devices; complementary fastening devices on said chest loop portions of the back and chest strap arranged for interlocking connection to secure the harness upon the wearer at the chest; leg straps formed independently of the back and chest strap and having free ends provided with adjusters for varying the effective length of said free ends, the opposite lower ends of said leg straps being secured to said main web and extending upwardly therefrom to form side loops; said leg straps then passing around the right and left sides respectively of the wearer, crossing over behind the back, then forwardly over the opposite shoulders and having the upper end portions thereof permanently secured respectively to said adjuster devices; a ring and a hook respectively on said side loop portions of the leg straps; and a hook and a ring adjustably mounted respectively on the free end portions of said leg straps and arranged for interlocking connection respectively with the ring and hook on the said side loop portion of the leg straps to secure the harness upon the wearer at the legs; means to prevent disengagement of the respective end portions of the chest and back strap and the leg straps from said adjuster devices, said hook and said ring; and the said adjuster devices, said hook and said ring being constructed and arranged so that the respective end portions of the straps associated therewith are adjustable with respect thereto at the will of the wearer so that when said straps are placed under tension to tighten the same about the body of the wearer, the said adjuster devices, hook and ring operate to securely retain said straps in the positions to which adjusted.

19. A parachute harness comprising a main web arranged to pass under the seat of the wearer, thence up the front, to the shoulders; fittings on said main web arranged for positioning respectively in the forward shoulder regions at opposite sides of the wearer; said main web passing upwardly through said fittings and then reversely therethrough downwardly over and secured to the upward courses of said web; rings attached to said web portions at opposite sides of the chest of the wearer for attachment of a parachute pack; a back strap arranged to extend horizontally across the back and forwardly about the right and left hand sides of the wearer through openings in the main web at the front of the wearer; adjuster devices permanently secured respectively to the forward ends of said back strap; leg and chest straps secured adjacent their lower ends to the main web and extending upwardly therefrom to form side loops; said leg and chest straps then passing through openings in said main web; thence around the right and left sides respectively of the wearer, crossing over behind the back, then forwardly over the opposite shoulders, through said fittings and downwardly over the front of the wearer to form chest loops with the other end portions thereof adjustably connected respectively to said adjuster devices secured to said back strap; com-

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plementary fastening devices on said chest loop portions of the leg and chest straps arranged for interlocking connection to secure the harness upon the wearer at the chest; a ring and a hook respectively on said side loop portions of the leg and chest straps; a hook and a ring adjustably mounted respectively on the lower free end portions of said leg and chest straps and arranged for interlocking connection respectively with the ring and hook on the said side portions to secure the harness upon the wearer at the legs; and means to prevent disengagement of the respective end portions of the leg and chest straps from said adjuster devices, hook and ring.

20. A parachute harness comprising a main web arranged to pass under the seat of the wearer, thence up the front, to the shoulders; fittings on said main web arranged for positioning respectively in the forward shoulder regions at opposite sides of the wearer; said main web passing upwardly through said fittings and then reversely therethrough downwardly over and secured to the upward courses of said web; rings attached to said web portions at opposite sides of the chest of the wearer for attachment of a parachute pack; a back strap arranged to extend horizontally across the back and forwardly about the right and left hand sides of the wearer through openings in the main web at the front of the wearer; adjuster devices permanently secured respectively to the forward ends of said back strap; leg and chest straps secured adjacent their lower ends to the main web and extending upwardly therefrom to form side loops; said leg and chest straps then passing through openings in said main web thence around the right and left sides respectively of the wearer, crossing over behind the back, then forwardly over the opposite shoulders, through said fittings and downwardly over the front of the wearer to form chest loops with the other end portions thereof adjustably connected respectively to said adjuster devices secured to said back strap; complementary fastening devices on said chest loop portions of the leg and chest straps arranged for interlocking connection to secure the harness upon the wearer at the chest; a ring and a hook respectively on said side loop portions of the leg and chest straps; a hook and a ring adjustably mounted respectively on the lower free end portions of said leg and chest straps and arranged for interlocking connection respectively with the ring and hook on the said side loop portions to secure the harness upon the wearer at the legs; the said adjuster devices, hook and ring being constructed and arranged so that the respective end portions of the straps associated therewith are adjustable with respect thereto at the will of the wearer and so that when said straps are placed under tension to tighten the same about the body of the wearer, said adjuster devices, hook and ring operate to securely retain said straps in the positions to which adjusted.

21. A parachute harness comprising a main web arranged to pass under the seat of the wearer, thence up the front, to the shoulders; fittings on said main web arranged for positioning respectively in the forward shoulder regions at opposite sides of the wearer; said main web passing upwardly through said fittings and then reversely therethrough downwardly over and secured to the upward courses of said web; rings attached to said web portions at opposite sides of the chest of the wearer for attachment of a parachute pack;

a back strap arranged to extend horizontally across the back and forwardly about the right and left hand sides of the wearer through openings in the main web at the front of the wearer; adjuster devices permanently secured respectively to the forward ends of said back strap; leg and chest straps secured adjacent their lower ends to the main web and extending upwardly therefrom to form side loops; said leg and chest straps then passing through openings in said main web, thence around the right and left sides respectively of the wearer, crossing over behind the back, then forwardly over the opposite shoulders, through said fittings and downwardly over the front of the wearer to form chest loops with the other end portions thereof adjustably connected respectively to said adjuster devices secured to said back strap; complementary fastening devices on said chest loop portions of the leg and chest straps arranged for interlocking connection to secure the harness upon the wearer at the chest; a ring and a hook respectively on said side loop portions of the leg and chest straps; a hook and a ring adjustably mounted respectively on the lower free end portions of said leg and chest straps and arranged for interlocking connection respectively with the ring and hook on the said side loop portions to secure the harness upon the wearer at the legs; and means to prevent disengagement of the respective end portions

of the leg and chest straps from said adjuster devices, hook and ring; the said adjuster devices, hook and ring being constructed and arranged so that the respective end portions of the straps associated therewith are adjustable with respect thereto at the will of the wearer and so that when said straps are placed under tension to tighten the same about the body of the wearer, said adjuster devices, hook and ring operate to securely retain said straps in the positions to which adjusted.

JOSHUA MILLER.
BERGIE L. KAUFFMAN.
JAMES T. TRUELSEN.

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Certificate of Correction

Patent No. 2,475,631

July 12, 1949

JOSHUA MILLER ET AL.

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 4, line 12, for the numeral "35" read 33; column 12, line 50, for the word "worm" read *form*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 7th day of February, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.