

April 20, 1943.

F. SMITH
PARACHUTE PACK
Filed Nov. 15, 1938

2,316,896

3 Sheets-Sheet 1

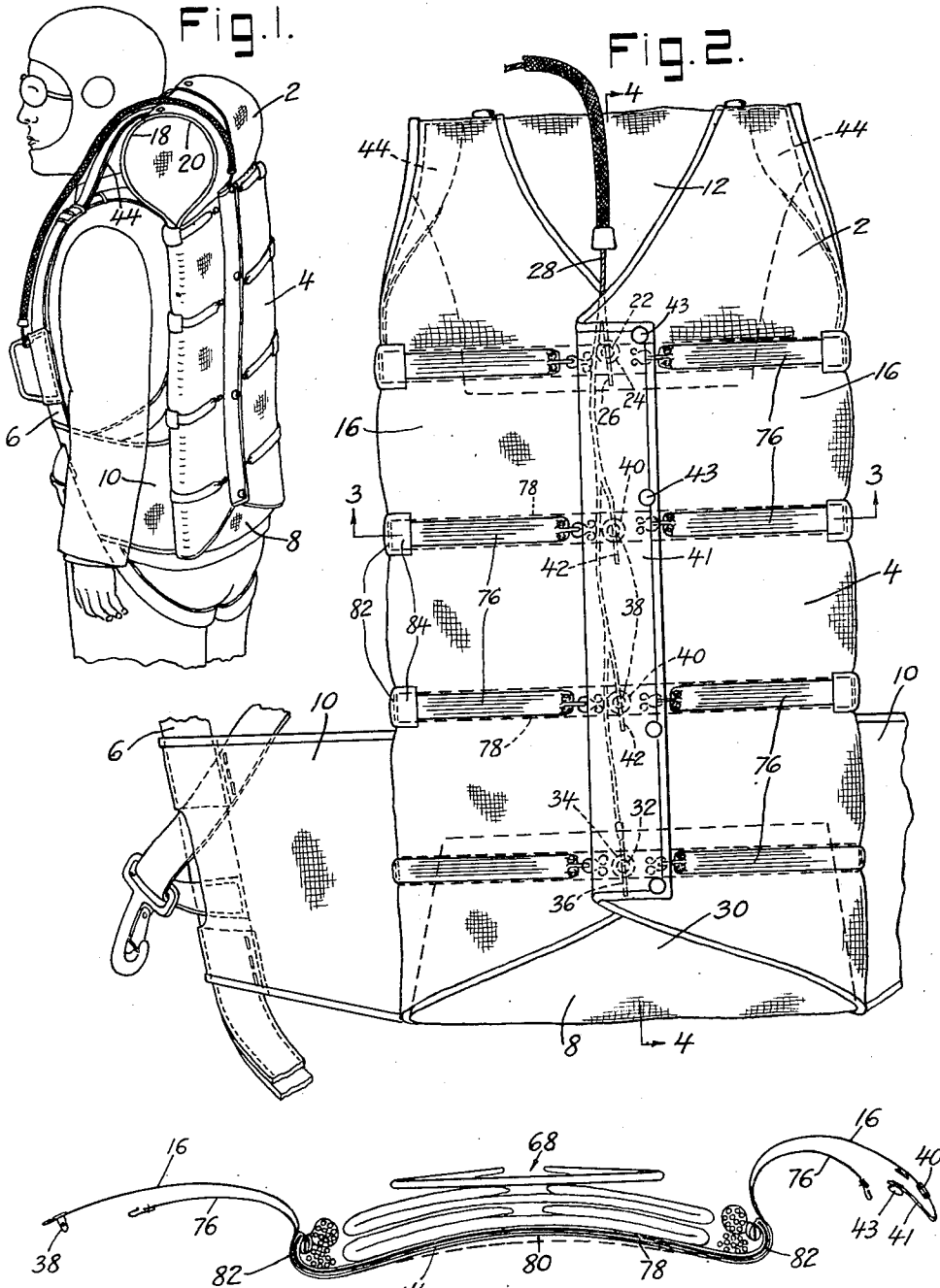


Fig. 3.

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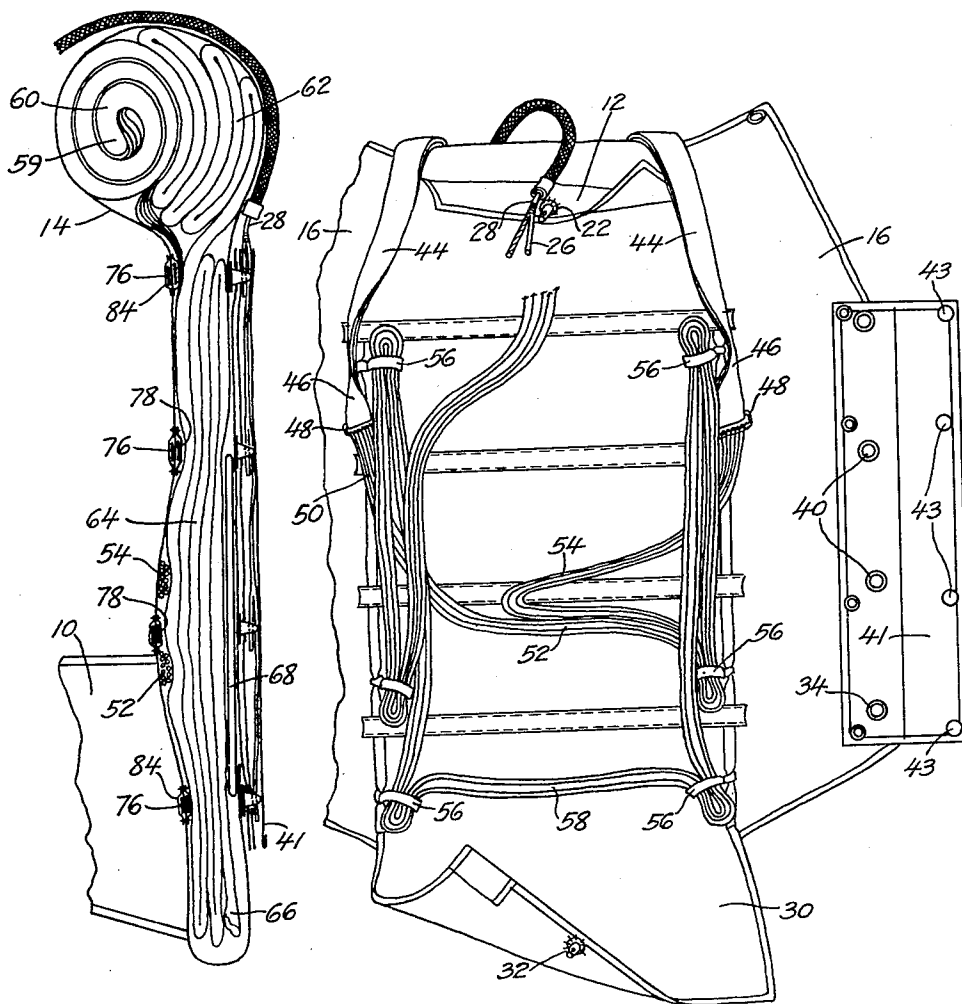


Fig. 4.

Fig. 5.

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3 Sheets-Sheet 3

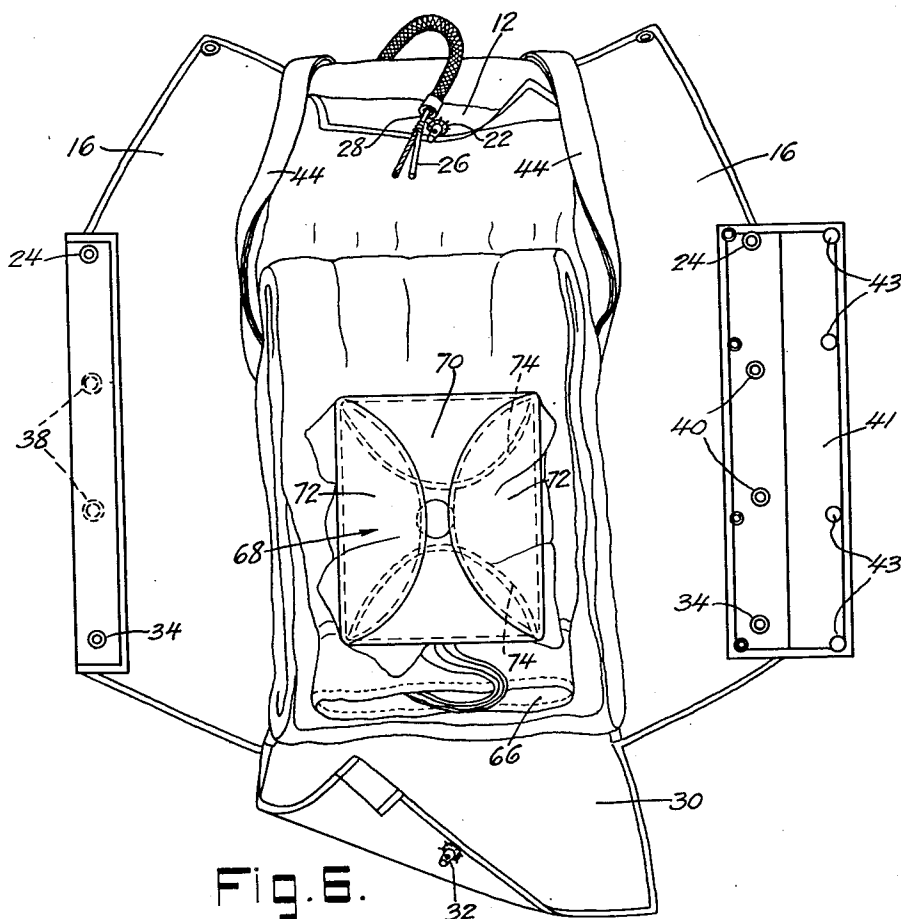


Fig. 6.

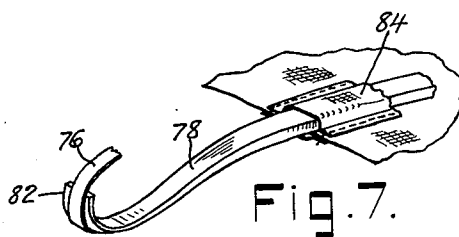


Fig. 7.

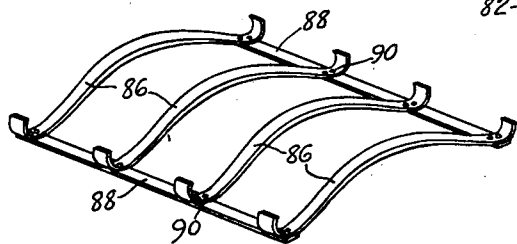


Fig. 8.

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UNITED STATES PATENT OFFICE

2,316,896

PARACHUTE PACK

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Application November 15, 1939, Serial No. 304,559

22 Claims. (Cl. 244-148)

My invention relates to parachute packs and particularly to back packs which are thin and flexible and are so constructed and arranged that they do not take up sufficient space to crowd the wearer or interfere with his movements in the operation of air craft or in the manipulation of cameras, machine guns or other apparatus.

Back packs heretofore used have generally been from four to five inches thick and have been packed so tight that they are hard and uncomfortable to the wearer. This has made it necessary for the user to sit so far forward in his seat that it is difficult to operate the air craft. Moreover if a cushion is employed to make the seat comfortable for long flights the objectionable crowding is increased. While the need for a parachute is greatest in military air craft the available space in such air craft is very limited and the operator must be subjected to the least possible restraint to enable him to execute unusual maneuvers readily.

In order to meet these conditions various types of parachute packs have been designed. In certain of these packs the parachute canopy has been folded or packed loosely so as to be comfortable to the wearer. Sometimes also the parachute is so arranged that it extends about the wearers sides or beneath the armpits. However in such soft or loose packs the means employed for drawing the pack flaps open to release the parachute have been so constructed that they tend to force the loose folds of the parachute toward the back or center of the pack with the result that the folds of the parachute become bunched together in a short time and the pack soon assumes a form in which it is not materially thinner than a conventional back pack. Furthermore the type of pilot chute heretofore used has been such that it is not readily confined in a loose pack and tends to become covered by or entangled in the loose folds of the main parachute canopy so that it will not open readily or may prevent or delay opening of the main parachute when it is released.

In order to overcome these objections to constructions of the prior art I have developed a thin flexible parachute pack adapted to be worn on the back and embodying means which serve to hold the folds of the parachute in place so that they will not become bunched together in use. In the preferred form of my invention hereinafter described the pilot chute employed in a pack of this type has a substantial portion of its surface extended at all times so that it cannot become entangled in or covered by the

5 folds of the main parachute canopy. A pilot chute of this type is shown and described in my copending application Serial No. 293,542, filed September 6, 1939, and includes means which operate to throw open the pack flaps on release thereof and thereby aid or render unnecessary other types of pack opening means.

10 In obtaining the advantages of my invention I prefer to arrange the main canopy of the parachute within the pack in such a way that a substantial portion and in some cases the major part of the canopy is folded into a body which is supported on the users shoulders above the shoulder blades and preferably adjacent the nape of the neck. This permits the formation of a thin flexible back portion for the pack and a thicker upper portion which may serve as a head rest and in any event is not so located or of such thickness as to crowd the wearer as he sits in the conventional seat. Furthermore the enlarged upper portion of the pack is held in a position in which it will not interfere with the escape from the cockpit or the movements of the operator in manipulating the aircraft or its equipment.

25 A further and important feature of my invention resides in the use of means for retaining the folds of a parachute in place within a pack. For this purpose I prefer to use spreading members or a frame which may be formed of spring material and cooperate with elastic flap opening means to retain the folds of the parachute and the suspension lines in place. The construction herein described and shown serves to prevent bulging of the pack at the center and in fact compresses the center to a thickness of only an inch or two.

40 Other features of my invention reside in novel arrangements of the suspension lines within the pack; novel means for holding the pack in place so that it will not interfere with the wearer's movements about the cockpit or in escaping therefrom; novel constructions for the pack cover and other elements of the construction and arrangement of the pack and its contents.

45 One of the objects of my invention is to provide a novel type of parachute back pack having a thin back portion.

50 Another object of my invention is to provide a parachute pack wherein a substantial portion of the canopy of the main parachute is supported on the wearer's shoulders.

55 A further object of my invention is to provide a parachute pack wherein at least a portion of

the folds of the canopy are loosely packed but are held against displacement.

Another object of my invention is to provide a parachute back pack with means serving to prevent bulging of the pack at the center thereof.

Another object of my invention is to provide a parachute pack which is thin and flexible and adapted to be retained in position so as to present the minimum restriction to the wearer's movements.

These and other objects and features of my invention will appear from the following description thereof wherein reference is made to the figures of the accompanying drawings.

In the drawings:

Fig. 1 is a perspective of a typical parachute pack embodying my invention as positioned when in use.

Fig. 2 is a rear elevation of the parachute pack of Fig. 1,

Fig. 3 is a horizontal sectional view taken on the line 3—3 of Fig. 2,

Fig. 4 is a vertical sectional view of the construction shown in Fig. 2 taken on the line 4—4 thereof,

Fig. 5 is a plan view of the parachute pack of Fig. 1 with the flaps thereof opened and the parachute canopy removed to show a typical arrangement of the suspension lines within the pack,

Fig. 6 is a perspective of a parachute pack embodying my invention with the parachute folded preparatory to closing the pack,

Fig. 7 is a perspective of a detail of the construction of Figs. 1 to 6 with parts broken away; and

Fig. 8 is a perspective of an alternative type of pack frame embodying my invention.

In that form of my invention illustrated in the drawings the pack is formed with an enlarged upper portion 2 and a lower back portion 4. The pack is held in position on the wearer by suitable harness or webbing indicated at 6 and so arranged that it will support the enlarged portion 2 of the pack on the wearer's shoulders and above the shoulder blades, preferably adjacent the nape of the wearer's neck. The lower end 8 of the pack is held close to the wearer's body by means such as the corner members 10 which hold the sling portion of the harness in place and prevent the lower end of the pack from protruding outward from the body to catch on objects when the wearer bends over or attempts to escape from the cockpit.

The cover for the pack is formed of strong durable fabric and is provided with a top flap 12 which may be secured to the back 14 and side flaps 16 of the pack in such a way as to form a pocket or cover for receiving a substantial portion of the main parachute canopy. For this purpose the top flap 12 may be stitched at its edges to the side flaps 16 along the seam 18 for a short distance, say to the point 20 in Fig. 1. The top flap is arranged to extend downward beneath the side flaps 16 and is provided at its lower end with a locking cone 22 which projects through grommets 24 on the side flaps to receive the releasable locking pin 26 attached to the rip cord 28. A bottom flap 30 is folded upward beneath the side flaps and carries a locking cone 32 which passes through grommets 34 on the side flaps to receive a releasable locking pin 36. Two additional locking cones 38 are carried by one of the side flaps between the upper and lower grommets 24 and 34 and cooperate with grommets 40 on the other side flap and with other locking pins 42 to

hold the center portion of the side flaps releasably in place. The locking pins and rip cord connections are covered by the protecting flap 41 which is held in place by snap fasteners 43.

Within the pack the main parachute canopy is suitably folded, rolled or otherwise arranged so that a substantial portion of the canopy, preferably including the skirt portion thereof, is located within the enlarged upper portion 2 of the pack and only a limited number of folds or layers of the canopy, preferably including the peak thereof, are located in the lower back portion 4 of the pack. The suspension lines are suitably disposed within the pack and may extend about the edges of the pack or elsewhere so that they do not stiffen the back portion of the pack or form uncomfortable ridges therein. The pilot chute is located in the back portion directly beneath the side flaps 16 to permit instant release thereof when the pack is opened.

In the arrangement illustrated in Figs. 3, 4 and 5 the risers 44 which are attached to the harness worn by the user extend over the shoulders and down into the pack over the top flap 12 and beneath the side flaps 16, being turned outward adjacent the sides of the pack with the ends 46 thereof and the links 48 to which the suspension lines are connected positioned adjacent the back 14 of the pack about half way down the thin back portion so as to be located near the small of the wearer's back. The suspension lines 50 from the left hand riser, as seen in Fig. 5, pass across the pack to the right hand side thereof as shown at 52 and an equal length of the suspension lines attached to the right hand riser are arranged in a loop adjacent the lines 52 as indicated at 54. The lines from both risers then pass through a retaining loop 56 and upward along the right hand edge of the pack to another loop, thence downward and across the bottom edge at 58 and up the left side of the pack adjacent the edge thereof where they may be looped back and forth as shown. The ends of the suspension lines extend up to the enlarged upper portion 2 of the pack and are secured to the skirt 58 of the main canopy.

The portion of the canopy located in the enlarged upper portion of the pack may be folded or rolled in any desired manner but preferably the portion thereof adjacent the skirt is rolled as shown at 60 with the suspension lines extending between the convolutions of the roll whereas the upper portion of the canopy is folded as shown at 62. In this way it is possible to arrange a substantial part or even the major portion of the canopy within the upper portion of the pack.

That portion of the main parachute canopy adjacent the peak thereof is formed into long folds 64 which extend down the back of the pack to render the lower back portion 4 of the pack soft and comfortable and yet thin. The peak of the canopy, indicated at 66, is preferably located near the lower end of the pack and a pilot chute 68 is placed in the middle of the back portion directly beneath the side flaps 16.

The pilot chute illustrated in Fig. 6 is of the type set forth and claimed in my copending application referred to above. This pilot chute is particularly adapted for use in thin flexible back packs for the reason that it is provided with an extended flat center portion 70 and lateral wings which are folded into a flat construction when enclosed within the pack. The wings are urged outwardly by spring means and preferably are so folded that wings 72 attached to the long side

of the center portion are folded over the center portion and are located directly beneath the side flaps 16 so that when the locking pins are drawn from the cones to release the parachute the wings 12 are caused to spring upward and outward from the center throwing open the side flaps 16 of the pack cover. The wings 14 of the pilot chute adjacent the ends of the center portion 18 thereof are folded beneath the center and on release of the pack flaps they also tend to spring up and out raising the center frame and throwing the pilot chute clear of the pack so that it cannot fall to be caught in the air stream and act as an air anchor to pull out the main canopy to its full length.

The flat form of the pilot chute and the absence of bulky spring elements renders it possible to locate the pilot chute in the most favorable position within the pack to insure immediate release thereof when the pack is opened. Furthermore, the action of the spring actuated wings of the pilot chute serve to supplement the elastics employed to draw the side flaps of the pack apart when the rip cord is actuated.

The elastics used to pull open the pack flaps need only be applied to the side flaps 16 of the pack. These elastics, shown at 16 in Fig. 3 preferably extend about the pack and have the opposite ends thereof attached to the side flaps 16 adjacent the overlapping edges of the flaps. When the side flaps are drawn to their closed positions shown in Fig. 2 in packing the parachute, the elastics 16 are placed under tension and they remain under tension at all times while the pack is closed.

In order to hold the thin back portion 4 of the pack extended against the action of the elastics 16 and in order to hold the folds of the parachute canopy in place the back 14 of the pack is provided with a suitable framework or spreader members. The strips 18 which are bowed upward at the center 20 so as to extend toward the outer face of the pack as worn and away from the wearer's back. The strips preferably are thicker at the center and taper toward the ends to provide the desired strength at the center and yet have relatively flexible end portions. The ends of the strips are turned upward at 22 adjacent the edges of the pack to maintain the desired thickness at the sides of the pack. The elastics 16 preferably extend about the pack and are located over the spring strips. As shown in Fig. 7 the elastics may be held in place by means of tape or other fabric members 24 which also extend over the strips 18 and serve to secure the strips to the back portion 14 of the pack. In this way the upturned extremities 22 of the strips 18 serve to hold the spreader members and the elastics in spaced relation adjacent the edges of the pack and prevent the elastics from pressing against the edges of the folds of the parachute in such a way as to produce bulging at the center of the pack. At the same time the elastics press down against the center of the pack and cooperate with the upwardly bowed center portion of the strips 18 to hold the folds of the parachute canopy firmly in place. The center of the strips 18 are thus depressed in closing the pack so that they assume the dotted line position of Fig. 3.

The uppermost spring strip and its associated elastics serve to hold the folds of the parachute in the upper portion 2 of the pack by providing a restricted throat between the enlarged upper portion and the lower thin portion of the back. In this way the part of the parachute located in

the upper portion of the pack cannot slip downward or become otherwise displaced whereas the folds thereof in the lower thin portion of the pack are also held in place and are compressed to prevent bulging toward the center of the back.

The spreader members or strips shown in Figs. 2 and 3 of the drawings are spaced apart and are not connected to each other so that the pack is extremely flexible lengthwise thereof and offers substantially no restrictions to the wearer's movements in bending over. However, in some instances and particularly if elastics are applied to the upper and lower pack flaps it is desirable to provide means for holding the spreader members in spaced relation or to employ other types of frame work for the pack. As shown in Fig. 8 such a frame may embody a number of transversely extending spreading members 26 similar to those shown in Fig. 5 together with longitudinally extending spacing members 28 which may be riveted to the spreader members at 30.

The forms of my invention shown in the drawings and described above are preferred but the invention is capable of many and varied modifications. Thus the frame or spreader members described may be used in conventional back packs and in other types of parachute packs, while other types of frames or spreader members described may be used in conventional back packs and in other types of parachute packs, while other types of frames or spreader members may be used in parachute packs embodying my invention. Similarly although a typical method of folding or arranging the main parachute canopy is described by way of illustration the canopy may be arranged in various other ways within the pack. The location, arrangement and manner of stowing the suspension lines within the pack also may be varied considerably and other types of pilot chutes than that shown may be employed and they may be arranged in any suitable manner within the pack.

In view of such changes and modifications in the form, construction and arrangement of the elements which may be employed in the practice of my invention it should be understood that the preferred embodiments thereof herein shown and described are intended to be illustrative of my invention and are not intended to limit the scope thereof.

I claim:

1. A parachute back pack of generally rectangular outline having a cover formed with a back portion side flaps, a top flap and a bottom flap foldable into overlapping relation in closing the pack, said top flap extending from said back portion at substantially right angles to said side flaps and permanently being connected to the side flaps along a portion of the edges thereof whereby a recess is formed for receiving a part of a parachute canopy to form a relatively thick pack portion, said side flaps and bottom flaps being separated at their edges and adapted to receive the remainder of said parachute to form a thin pack portion, elastic means connected to the side flaps to draw them apart on release thereof, and spreader means extending transversely of said thin pack portion to hold said portion of the pack extended and formed with portions located adjacent the longitudinal edges of the thin portion of the pack and beneath the elastic means for overcoming the tendency of the elastic means to compress the pack at the edges.

2. A parachute pack having a flexible cover provided with flaps for closing the pack, elastic means connected to said flaps and extending over the same on one face of the pack to draw said flaps apart and release a parachute from the pack, and means for holding a parachute in place within said pack comprising a spreader member located adjacent the opposite face of the pack and bowed inwardly toward the center of the pack.
3. A parachute pack having a flexible cover with flaps extending from the sides thereof toward the center of one face of the pack, elastic means connected to said cover means for drawing said flaps apart to release a parachute from the pack, and means for maintaining said pack in a predetermined shape against the action of said elastic means comprising a spreader member extending across the pack adjacent the opposite face thereof and having the ends thereof turned upward at the sides of the pack.
4. A parachute pack having a flexible cover with flaps extending from the sides thereof toward the center of one face of the pack, elastic means connected to said cover for drawing said flaps apart to release a parachute from the pack, and means for maintaining said pack in a predetermined shape against the action of said elastics comprising a spreader member extending across the pack adjacent the opposite face thereof and having the ends thereof turned upward at the sides of the pack, said elastic means extending inward from the sides of said pack toward the center thereof at points adjacent the upturned ends of said spreader member.
5. A parachute pack having a flexible cover with flaps extending from the sides thereof toward the center of one face of the pack, elastic means connected to said cover for drawing said flaps apart to release a parachute from the pack, and means for maintaining said pack in a predetermined shape against the action of said elastic means comprising a spreader member extending across the pack adjacent the opposite face thereof and bowed inward toward the pack at the center, the opposite ends of said member being turned upward at the sides of said pack and said elastic means extending about said pack and inward over the upturned ends of the spreader member toward the free edges of said flaps.
6. A parachute pack having a flexible cover and yieldable members carried by said cover and located adjacent opposite faces of said pack, said members bearing against the center of said pack to compress the pack at the center and means extending from one face of the pack toward the other adjacent the edges of the pack for holding said members in predetermined spaced relation to maintain the desired thickness of the pack adjacent the edges thereof.
7. A parachute back pack having the center thereof compressed so as to be thinner than the edges thereof, said pack having suspension lines enclosed therein and located adjacent and parallel to at least three edges of the pack.
8. A parachute back pack having a flexible cover and formed with a thin, flat, flexible portion presenting one face adapted to be located adjacent the user's back and an opposite face directed away from the user's back, said portion being thinner at the center than at the edges thereof and means enclosed by said cover and extending from one face of said portion toward the other adjacent opposite edges of the pack to preserve the thickness of the pack at the edges.
9. A parachute back pack having a thin, flat, flexible portion presenting one face adapted to be located adjacent the user's back and an opposite face directed away from the user's back, said portion being thinner at the center than at the edges thereof, means carried by the pack pressing the front and rear faces thereof together adjacent the center of said portion to retain the shape thereof and elements at the edges of the pack extending from one face thereof toward the other to preserve the thickness of the pack at the edges against the action of said means.
10. A parachute back pack comprising a parachute canopy and a flexible cover enclosing the parachute canopy, said cover being formed with a portion forming a relatively thick pack portion within which is packed the skirt of the parachute canopy and a portion of the canopy adjacent the skirt, the peak portion of the parachute canopy extending from the thick portion of the pack and packed within by a portion of said cover forming a thin, flat and flexible back engaging back portion.
11. A parachute back pack comprising a parachute canopy and a cover extending about the parachute canopy and enclosing the same, said pack having a relatively thick upper portion and a lower relatively thin and flexible back engaging portion, said parachute canopy being arranged with the skirt portion of the canopy packed within the thick portion of the pack and the peak portion of the canopy packed within the lower, flexible portion of the pack.
12. A parachute pack comprising a parachute canopy and a cover extending about said canopy and enclosing the same, said pack having a thick portion within which the skirt of the parachute canopy is packed and a thin portion within which the peak of the canopy is packed.
13. A parachute back pack of generally rectangular outline and embodying a flexible cover with a parachute canopy enclosed therein, said cover being formed with a downwardly facing pocket in the upper portion thereof and said canopy having a portion thereof arranged in a plurality of short folds and located within said pocket so as to form a relatively thick upper pack portion, and having the remainder of the canopy arranged in a lesser number of longer folds and located within the lower portion of the pack cover so as to form a thinner lower back portion of the pack, a pilot chute connected to the canopy and enclosed within said cover and located below said pocket, and resilient means carried by the pack cover serving to compress the pack and aid in retaining said folds of the canopy in said arrangements in the pack.
14. A parachute back pack of generally rectangular outline and embodying a flexible cover with a parachute canopy enclosed therein, said cover being formed with a downwardly facing pocket located at the upper end of the pack and said canopy having a portion thereof arranged in a plurality of short folds and located within said pocket so as to form a relatively thick upper pack portion, and having the remainder of the canopy arranged in a lesser number of longer folds and located within the lower portion of the pack cover so as to form a thinner lower back portion of the pack, a pilot chute connected to the canopy and enclosed within said cover and located below said pocket, said cover having resilient means carried thereby and lo-

cated adjacent opposite faces of the thin portion of the pack directly below said upper thick pack portion to press said faces together and aid in retaining said short folds of the canopy in place within the upper portion of the pack.

15. A parachute back pack of generally rectangular outline and embodying a flexible cover with a parachute canopy enclosed therein, said cover being formed with a back portion, side and bottom flaps and with a downwardly turned top flap secured at its side edges to the side flaps to form a downwardly opening pocket adjacent the upper end of the pack, said canopy having a portion thereof arranged in a plurality of short folds and located within said pocket in the upper portion of the pack cover so as to form a relatively thick upper pack portion, and having the remainder of the canopy arranged in a lesser number of longer folds and located within the lower portion of the pack cover so as to form a thinner lower back portion of the pack, a pilot chute connected to the canopy and located beneath the side flaps of the cover to withdraw the canopy from the cover when the flaps are released, resilient means carried by the pack cover and extending over said side flaps so as to aid in retaining said folds of the canopy in said arrangements within the pack cover, and harness secured to said pack and arranged to support the pack on a wearer's back with the upper thick portion thereof located above the wearer's shoulder blades and adjacent the nape of the wearer's neck.

16. A parachute back pack of generally rectangular outline embodying a cover with a parachute canopy enclosed therein, said cover being formed with a downwardly facing pocket therein adjacent the upper portion of the pack, said canopy having a portion thereof arranged in a plurality of short folds and located within said pocket in the cover to form a thickened upper pack portion, the remainder of said canopy being arranged in a lesser number of longer folds enclosed within the lower portion of said cover to form thin flexible pack portion, a pilot chute connected to the canopy and enclosed within said cover, and means for releasably retaining said cover closed about the parachute canopy and pilot chute.

17. A parachute back pack of generally rectangular outline embodying a cover with a parachute canopy enclosed therein, said cover being formed with a downwardly facing pocket therein adjacent the upper portion of the pack, said canopy having a portion thereof arranged in a plurality of short folds and located within said pocket in the cover to form a thickened upper pack portion, the remainder of said canopy being arranged in a lesser number of longer folds enclosed within the lower portion of said cover to form a thin flexible pack portion, spreader members carried by and extending transversely of the lower thin flexible portion of the pack to maintain said portion relatively thin and flat, and means for releasably retaining said cover closed about the parachute canopy.

18. A parachute back pack embodying a flexible cover with a parachute canopy enclosed therein, said cover having a pocket in the upper portion thereof and said canopy having a portion of the canopy including the skirt folded upon

itself a plurality of times and located within said pocket to render the upper portion of the pack thicker than the lower portion thereof, the remainder of said parachute canopy including the peak thereof being arranged in a lesser number of folds in the lower portion of the pack to provide a lower thin flexible pack portion, and harness secured to the pack cover and serving to hold the thicker upper portion of the pack above the wearer's shoulder blades and serving to hold the thinner lower portion thereof adjacent the wearer's back.

19. A parachute back pack comprising a flexible cover of generally rectangular outline having a parachute canopy enclosed therein, said pack having a relatively thick upper portion and relatively thin flat lower portion, the portion of said parachute canopy adjacent the skirt thereof being rolled upon itself and located within the upper thick portion of the pack, and the portion of the canopy adjacent the peak thereof being arranged in flat zig-zag folds and located within the lower thin portion of the pack.

20. A parachute back pack comprising a flexible cover of generally rectangular outline having a parachute canopy enclosed therein, said pack having a relatively thick upper portion and relatively thin flat lower portion, the portion of said parachute canopy adjacent the skirt thereof being rolled upon itself and located within the upper thick portion of the pack, and the portion of the canopy adjacent the peak thereof being arranged in flat zig-zag folds and located within the lower thin portion of the pack, said cover having the upper portion thereof formed with a pocket in which the rolled portion of the canopy is located, and means secured to the cover for retaining the pack on a wearer with the upper thick portion thereof located above the wearer's shoulder blades and adjacent the nape of the wearer's neck.

21. A parachute back pack having a cover formed of flexible material and including a base, side flaps and top and bottom flaps secured to the base and presenting free edges which are foldable into overlapping relation to close the pack, and a parachute canopy located within the pack and having one portion thereof including the canopy skirt arranged in a plurality of short folds and positioned adjacent the upper portion of the pack and covered by the top flap of the cover to provide the pack with an upper, relatively thick pack portion, the remainder of the parachute canopy including the peak thereof being arranged in a lesser number of longer folds and located adjacent the lower portion of the pack and covered by the side and bottom flaps to provide the pack with a lower relatively thin flexible back portion.

22. A parachute pack having a flexible cover and means for maintaining the pack in a desired shape comprising a plurality of spaced, independently movable spreader members extending across the pack from one side thereof to the other adjacent one face of the pack, the ends of said members being located adjacent the edges of the pack and turned toward the opposite face thereof to maintain a predetermined thickness of the pack adjacent said edges.

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