Aug. 24, 1943. F. G. MANSON ET AL 2,327,358

VARIABLE FORM PARACHUTE PACK

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FIG. 2.

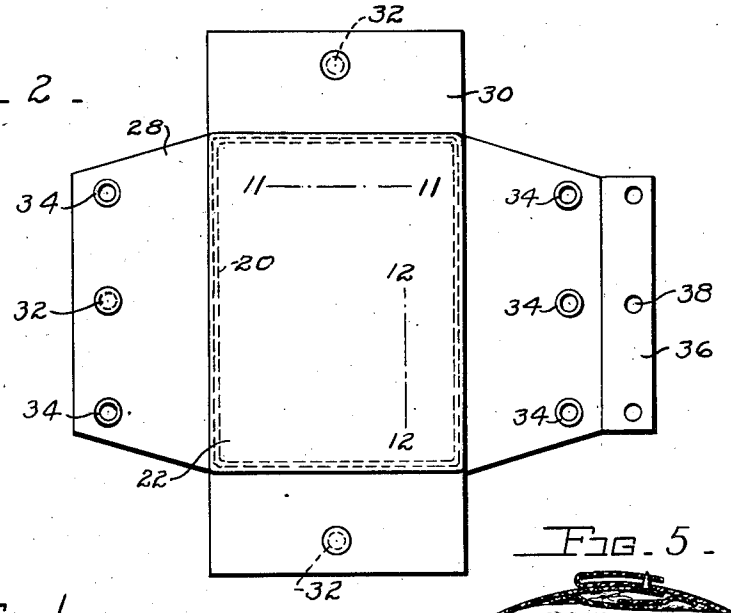


FIG. 1.

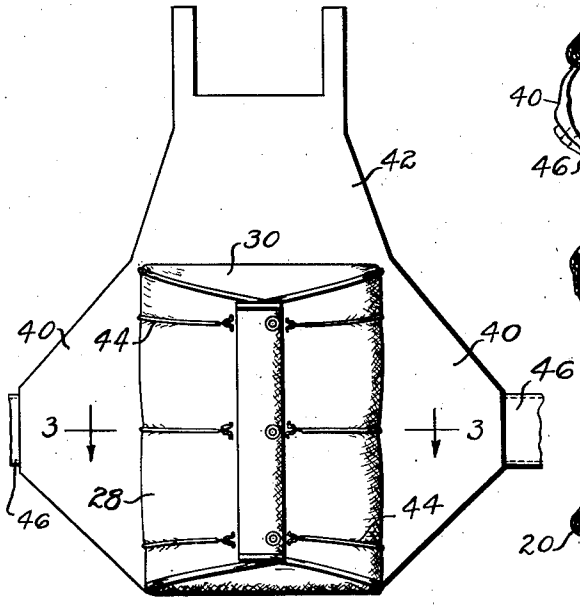


FIG. 5.

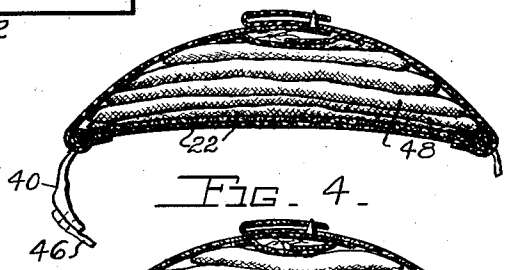


FIG. 4.

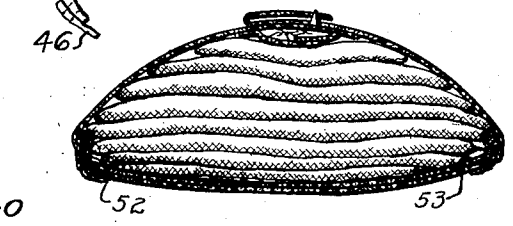
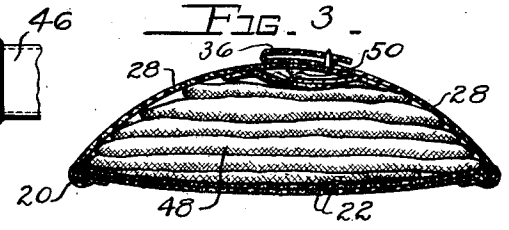


FIG. 3.



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FIG. 7.

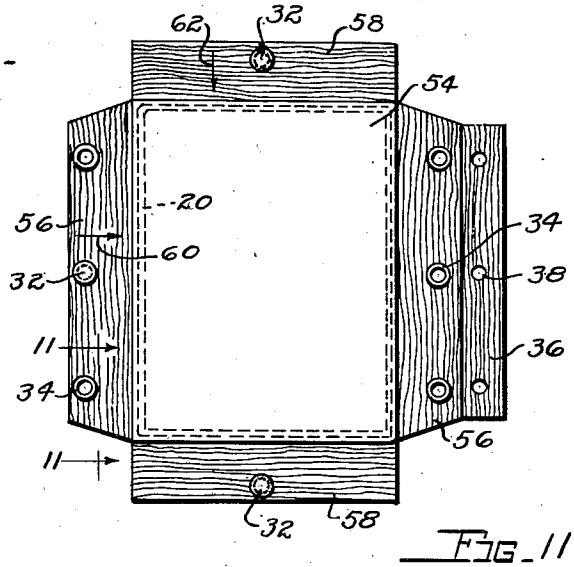


FIG. 11.

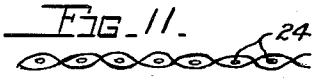


FIG. 10.

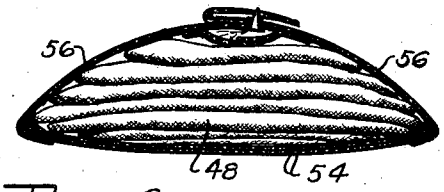


FIG. 12.

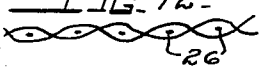


FIG. 8.

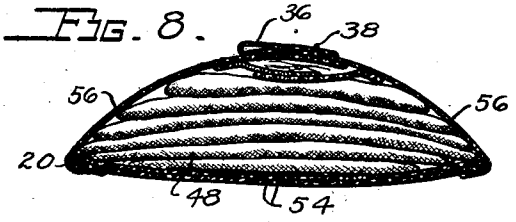


FIG. 6.

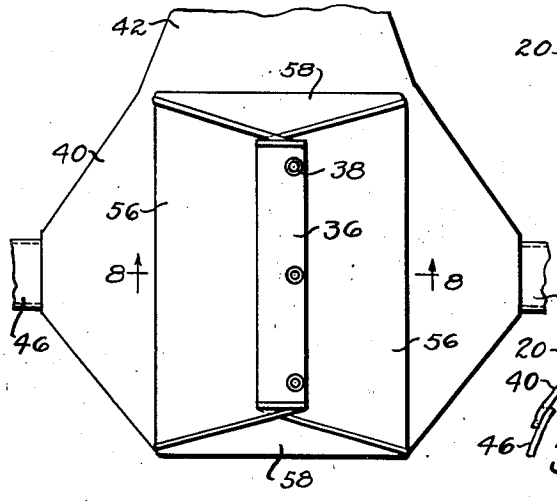
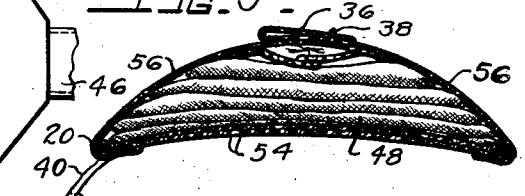


FIG. 9.



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UNITED STATES PATENT OFFICE

2,327,358

VARIABLE FORM PARACHUTE PACK

Frank G. Manson and James J. Maskey,
Dayton, Ohio

Application September 5, 1941, Serial No. 409,689

9 Claims. (Cl. 244—148)

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

The invention described herein may be manufactured and used by or for Government for governmental purposes, without the payment to us of any royalty thereon.

This invention relates to improvements in parachute packs and particularly to that form of pack which is strapped to the wearer's body.

An object of the invention is to provide a pack which will more readily adapt itself to the shape of the wearer's body, to the end that it may be more comfortably worn.

Another object is to provide a pack in which the envelope itself is either wholly or partly made of an elastic fabric.

Another object is to provide an envelope of the kind indicated in which the direction and degree of the elasticity in the fabric is controlled, to the end that when the pack is strapped with uniform pressure to the body, a lesser resistance to bending will prevail in that direction in which the greater deflection is required.

Another object is to so control the elasticity in the fabric of the device that it will assist materially in ejecting the canopy of the pack when released.

Other objects and advantages will be seen to reside in the specific details of construction as the invention is further described and illustrated by drawings, wherein,

Fig. 1 is a rear elevation of the pack when made up, the belt flaps and shoulder flap being secured to the envelope.

Fig. 2 is a view of the open envelope only, the belt flaps and shoulder flap being omitted.

Fig. 3 is a cross section through the made up pack taken at 3—3 of Fig. 1 showing the interior of the pack as it appears before being drawn close up to the wearer's body.

Fig. 4 is a cross section similar to Fig. 3 except for a slight modification in the structure of the envelope.

Fig. 5 is cross section similar to Fig. 3 showing the form which the section Fig. 3 takes when strapped closely to the wearer's back.

Fig. 6 is a rear elevation of a made-up pack of modified design.

Fig. 7 shows the envelope of the pack Fig. 6 when it is open.

Fig. 8 is a cross section taken at 8—8 of Fig. 6 showing the interior of the pack when made up, but before it is strapped to the wearer's back.

Fig. 9 is a view similar to Fig. 8 except that it is shown as it would appear when strapped to the back of the wearer.

Fig. 10 is a cross section similar to Fig. 9 but modified in the disposition of the material used.

Fig. 11 is a fragmentary section to an enlarged scale through an elastic fabric wherein relatively heavy elastic strands are used.

Fig. 12 is a view similar to Fig. 11 except that the elastic material is of smaller gauge.

Like numerals refer to like parts throughout the views of the drawings.

Because of the fact that a parachute pack of the class herein shown is necessarily strapped relatively close to the wearer's body, and may therefore preferably be as yielding as possible in order that it may be more comportably worn, numerous efforts have been directed to the task of making a flexible pack, but these efforts have been directed largely to building the pack envelope on a more or less resilient wire framework.

In the several modifications of the invention herein disclosed, not only is the frame resilient but part or all of the fabric of which the pack envelope is made is per se elastic, this elasticity being so woven into the fabric that the extent and degree of elasticity corresponds to the requirement in each particular part of the device.

Referring to Figs. 1 to 5 inclusive which disclose one embodiment of the invention, a rectangular frame 20 is made of spring wire of a high degree of elasticity, the wire being as small and yieldable as will maintain proper form in the envelope.

Stitched together, with the frame 20 between them, are two bottom panels 22 which may be made of sheet rubber in which the resistance to elongation is the same in any direction, but may preferably be made of an elastic fabric into which filaments of rubber or similar material are interspaced in the warp or the woof or both.

When the panels 22 are thus provided with elastic filaments in two directions, those extending lengthwise of the panel may preferably be of a larger size than those which extend crosswise, because the deformation required crosswise of the panel will be greater than that required lengthwise.

A fragmentary enlarged section taken crosswise of the panel 22 therefore shows rubber filaments, as at 24, Fig. 11, of larger size than a similar section taken lengthwise as in Fig. 12 where smaller filaments 26 are shown.

Directional control of the resilience may also be had by employing more and closer spaced filaments of the same size in the warp than in the woof or vice versa as the case may require.

The side flaps 28 and end flaps 30 are made of flexible non-elastic fabric and are provided with

the customary cones 32 and grommets 34. The rip cord flap 36 with fasteners 38 is of conventional design.

In Fig. 1 the made up pack is shown with the belt supports 40 and shoulder piece 42 attached. Since the flaps 28 and 30 are made of non-elastic fabric the usual elastic cords 44 are provided for pulling the flaps back when the rip cord (not shown) is pulled.

The pack when made up appears as shown in the rear view Fig. 1, and the cross section Fig. 3, where the canopy 48 and pilot chute 50 are closed in by the flaps 28 and 30 in the usual manner. Before the pack is strapped to the wearer's back, the bottom panels 22 bulge outward slightly as seen in Fig. 3, but when drawn close up to the back, by the belt straps 46, a horizontal cross section through the pack will appear more nearly as in Fig. 5, where the elastic bottom panels 22 are flexed inwardly. A vertical cross section through the pack is not shown because in that direction the panels may alternate between a straight, a concave, or a convex contour, depending on whether the wearer stands erect, stoops or sits.

When a jump is initiated, and up to the time of pulling the rip cord, the chutist usually maintains a stooping posture, whereby the elastic panels 22 not only take a concave form as in Fig. 5, but are similarly concaved in the vertical direction, all of which has a tendency to help eject the canopy when the rip cord is pulled.

The modification shown in Fig. 4 is not otherwise different from the device just described, either in structure or operation, except for the side strips 52 which give depth to the envelope. In this construction, the last two or three folds of the canopy to be drawn from the envelope have their edges as at 53, slightly tucked under at the side strips which slightly restrains their ejection from the envelope and insures that they will come out last. It is a matter still open to discussion whether an envelope having side strips or one without them offers the greater element of safety.

A variant form of pack embodying the general idea of employing elastic fabric with directional control of the elasticity is shown in Figs. 6 to 9 inclusive. Here the elastic wire frame 20 is stitched between two bottom panels 54 of non-elastic flexible fabric, while the flaps 56 and 58 are made of fabric which is elastic in the direction of the arrows 60 and 62 respectively, but non-elastic at right angles to these arrows. Of course, bidirectional elastic fabric may be used for the flaps 56 and 58 if the elastic filaments which extend at right angles to the arrows 60 and 62 are at minimum extension when the flaps are attached to the bottom member. In such case the elastic in one direction of the flaps is never in use.

Conventional cones 32 and grommets 34 are provided, and the rip cord flap 36 and fasteners 38 are of standard design, but it will be observed that the flaps 56 and 58, when released as in Fig. 7, are much narrower than the flaps 28 and 30 of Fig. 2, the size and number of the elastic filaments which are woven into the fabric of the flaps being so determined that when the pack is made up and the envelope is closed as in Fig. 6, the elastic flaps 56 and 58 will have been stretched in the direction of the arrows 60 and 62 respectively an amount which brings them to substantially the width of the flaps 28 and 30 of Fig. 2.

By reference to Fig. 6 it will be observed that the elastic cords 44 of Fig. 1 are omitted, this being for the reason that they are not required, since each flap 56 or 58 has, per se, sufficient resilience to withdraw itself and permit free ejection of the canopy when the rip cord is pulled.

The cross section Fig. 8 shows the pack when made up but not strapped to the body, while the cross section Fig. 9 is intended to illustrate the shape of the pack when it is drawn up close to the body for use. These two views differ in no material respect from Figs. 3 and 5 heretofore explained, except for the placement of the elastic filaments in the fabric used in the envelope. Where no such filaments extend lengthwise in the parts of the envelope of Fig. 7, none appear in the cross section taken therethrough.

To provide still another variant of the invention, a pack envelope may be made which combines the advantages of both of the hereinbefore described exemplifications. In such variant the flaps may be made of elastic material having unidirectional elasticity as illustrated in Fig. 7, while the panels may have a preselected elasticity both lengthwise and crosswise, the one equal to or greater than the other. The cross-sectional view Fig. 10 illustrates this latter embodiment of the invention.

While several embodiments of the invention have been shown and described, whereby the objects hereinbefore set forth are attained, it will be apparent that other exemplifications may well be conceived within the scope of the general idea, which may consist, at least in part, in providing a more flexible and better operating parachute pack by employing, for some of the elements of the device, an elastic fabric into which a controlled degree of unidirectional or bidirectional elasticity has been woven, the degree and direction of elasticity varying with the requirement of the particular element in which it is used.

Having thus described the invention, we claim:

1. In a parachute pack, a pack envelope having a bottom member with fabric side flaps and end flaps attached, said bottom member being made of sheet elastic, the amount of elastic material in the sheet being different crosswise of the sheet than lengthwise.

2. In the envelope of a parachute pack, a bottom member in the form of a panel with fabric side flaps and end flaps attached, said bottom member being made of flexible fabric woven with elastic inclusions extending both crosswise and lengthwise of the panel, the elastic inclusions being so distributed that resistance to deformation is greater in one direction of the panel than in the other.

3. In the envelope of a parachute pack, a bottom member in the form of a panel with fabric side and end flaps attached, said bottom member being made of a piece of woven fabric having at least part of the threads both lengthwise and crosswise of rubber or the like, the distribution of which is such that resistance to deformation is less in the crosswise direction than in the lengthwise direction.

4. In a parachute pack, a pack envelope having a fabric bottom member with side flaps and end flaps attached, said side flaps and end flaps being made of resilient sheet material in which the resilient content is different crosswise of the sheet than lengthwise.

5. In the envelope of a parachute pack, a fabric bottom member with side flaps and end flaps attached, said side flaps and end flaps being made of a woven fabric wherein at least part of

the threads of the weave in one direction thereof are of an elastic material.

6. In the envelope of a parachute pack, a fabric bottom member with side flaps and end flaps attached, said flaps being made of a piece of fabric woven from threads, part of which in one direction only are of elastic material, that direction being at right angles to the line of attachment.

7. In a parachute pack, a pack envelope having a bottom member with side flaps and end flaps, said bottom member and said flaps being made of an elastic fabric in which resistance to deformation varies in different directions of the fabric.

8. In a parachute pack envelope, a bottom member with side flaps and end flaps extending therefrom, said member and flaps being made of an elastic fabric in which directional elasticity is so controlled that resistance to deformation is greater lengthwise than crosswise of the panel and deformation in the flaps is at right angles to their junction with the bottom member.

9. In a parachute pack envelope, a bottom member with side flaps and end flaps extending, said member and flaps being made of a flexible fabric woven from threads, a part of which are elastic, the number and size of the elastic threads being different in different directions, whereby yieldability to deformation varies in different parts according to requirement.

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