Oct. 3, 1950 E. V. STEWART 2,524,277

PILOT CHUTE

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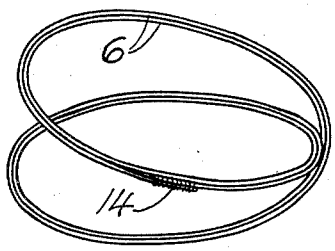


Fig. 3.

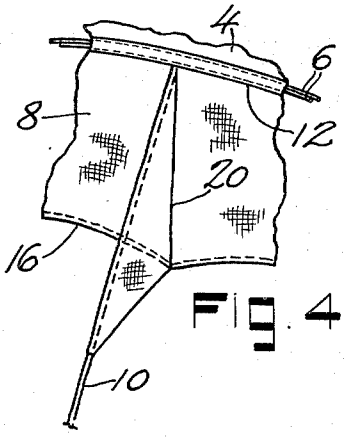


Fig. 4.

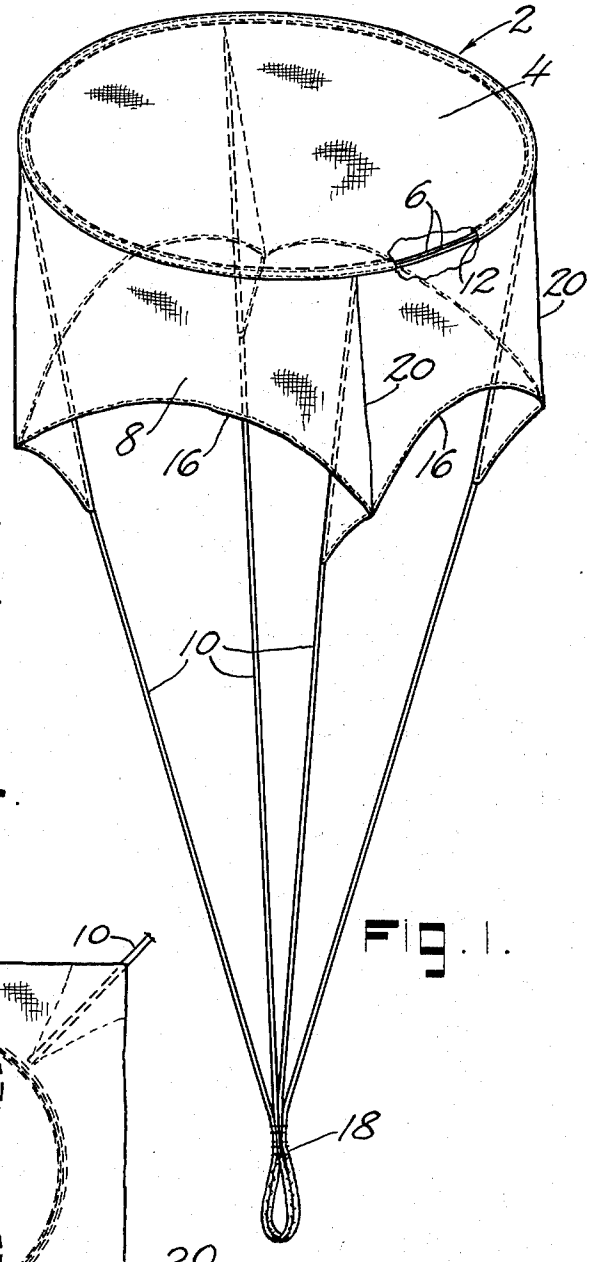


Fig. 1.

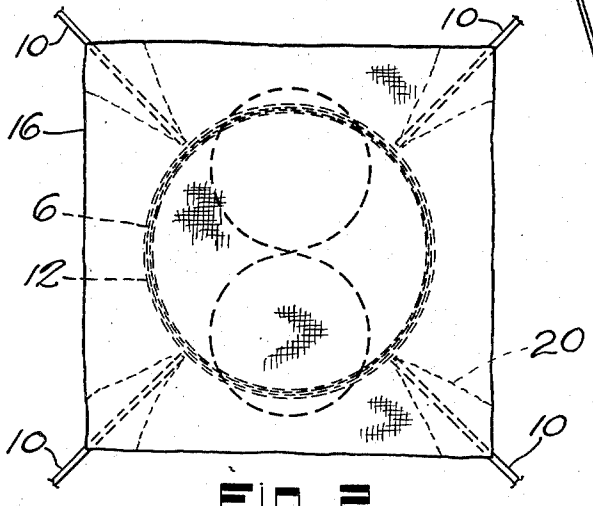


Fig. 2.

INVENTOR.
E. VERNE STEWART
BY Albert Sperry.
ATTORNEY

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PILOT CHUTE

Emry Verne Stewart, Manchester, Conn., assignor to Pioneer Parachute Company, Inc., Manchester, Conn., a corporation of Connecticut

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4 Claims. (Cl. 244—149)

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My invention relates to parachutes and particularly to pilot chutes used for withdrawing the main parachute canopy from a pack in which it is folded.

Pilot chutes in most common use heretofore have embodied a number of ribs or wings which are urged toward an outwardly projecting position by coiled spring members or similar means. However, such constructions are complicated and expensive to produce and the ribs or wings present projections and obstructions on which the suspension lines and fabric of the pilot chute or main parachute may be caught and tangled or by which the parachute may be torn so as to prevent or interfere with effective operation of the parachute.

Some pilot chutes have been made in which a flexible spring ring which normally tends to expand to a circular form is used as a canopy extending means. Such rings have the advantage of eliminating angular projections and they may be twisted into the form of a figure 8 and then the opposite halves of the figure can be folded into overlapping relation so as to permit the pilot chute to be reduced to a compact form for enclosure in a parachute pack. However, in all parachutes where such a spring ring has been used the fabric bounded by the ring has been loose or formed with seams or gores which cause the fabric to assume a substantially hemispherical form during descent. With this construction, when the spring ring is folded into its twisted or coiled and overlapping form, the turns or coils of the ring tend to slip through one another and the loose fabric bounded by the ring permits the coils to expand into interlocking positions. The ring then cannot expand or untwist to extend the pilot chute canopy so that the pilot chute is rendered wholly inoperative. For this reason spring ring expanding means have never been extensively used in pilot chutes.

In accordance with my invention these objections to constructions of the prior art are overcome and a simple non-fouling type of pilot chute is provided in which spring ring expanding means are used but the interlocking of turns of the ring on folding is prevented. Moreover, the form of the canopy of the pilot chute is greatly simplified so that a single seamless piece of fabric may be employed or a limited number of seams may be

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provided and the cost of manufacture of the pilot chute is materially reduced.

These advantages are preferably attained by eliminating loose fabric within the space bounded by the spring ring. When so constructed one turn or coil of the ring cannot slip through the other and expand so as to lock the ring against release to its untwisted and expanded form. Moreover, by extending the fabric forming the canopy beyond the edges of the spring ring an adequate skirt is formed for receiving and retaining air so as to insure effective action of the pilot chute in drawing the main parachute canopy from the pack in which it is folded.

One of the objects of my invention is to provide a simple and economical form of pilot chute having non-fouling characteristics.

Another object of my invention is to insure opening of a pilot chute having a flexible spring ring type of expanding means.

A further object of my invention is to provide a pilot chute with a substantially seamless canopy.

These and other objects and features of my 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 a typical form of pilot chute embodying my invention;

Fig. 2 is a plan view of the pilot chute canopy illustrated in Fig. 1 with the skirt spread laterally;

Fig. 3 is a perspective view illustrating the spring ring in a partially folded position; and

Fig. 4 is a perspective of a portion of the pilot chute shown in Fig. 1.

In that form of my invention illustrated in the drawing the pilot chute embodies a canopy 2 having a central extended portion 4 surrounded and held in a flat relatively taut condition by the spring ring 6. The fabric of the canopy extends beyond the sides of the ring 6 to form a skirt 8 to which suspension lines 10 are attached.

The canopy is preferably formed of a single flat sheet of fabric as shown in Fig. 2 and the spring ring 6 is located centrally of the sheet and secured in place with respect thereto by the inner reinforcing tape 12. The ring itself may be formed of any suitable resilient material capable

of assuming a normal annular form, but is preferably formed of a plurality of turns of relatively stiff piano wire having the opposite ends thereof secured together as shown at 14. Such a ring is not only flexible and resilient, but it may be twisted and folded readily without taking a permanent set or becoming deformed since the turns of the wire may slip and move relative to each other when the ring is twisted to fold the pilot chute into a compact form for stowing in a parachute pack.

The marginal portion of the canopy fabric which is located about the exterior of the ring 6 forms the skirt 8 of the pilot chute. The edges 16 of the sheet of fabric are folded or hemmed and may be reinforced about the edge if desired. The suspension lines 10 are secured to the fabric of the canopy adjacent the tapes 12 and extend diagonally outward therefrom beyond the corners of the fabric sheet so as to be secured together at 18 for attachment to the peak of the main parachute canopy. As shown in Figs. 1 and 4 the suspension lines extend downwardly from the flat extended portion of the canopy and the loose corner portions or folds of the fabric are stitched together along the lines 20 to shape the skirt and cause it to be held in a cupped, air retaining form when the pilot chute is released.

In folding the pilot chute for placement in a parachute pack the spring ring is grasped at opposite sides and twisted into the form of the figure 8. Such twisting tends to stretch or distort the fabric of the central portion 4 of the canopy in a direction parallel to the axis of the twist as shown in dotted lines in Fig. 2, but the fabric is made loose in a transverse direction and the flexibility and yielding characteristics of both the fabric and the ring permit ready twisting of the ring and central portion of the canopy without imposing undue strains on the fabric. Thereafter the halves of the ring are folded into overlapping relation as shown in Fig. 3. When in this folded or overlapped relation the fabric is still relatively taut in that looseness of the fabric is taken up by the ring and the turns or coils are prevented from slipping through one another into positions in which interlocking of the coils will occur. At the same time the spring ring is placed under such tortional strain that it will at all times tend to untwist and expand its flat fully extended position of Fig. 1 upon release of the pilot chute from a parachute pack or other retaining means.

On release of the pilot chute the flat form of the portion of the canopy surrounded by the spring 6 permits the spring to hold the fabric in a flat, expanded or relatively taut condition. The pilot chute then presents an extended area to be caught by the air through which the parachute descends while the skirt 8 of the canopy surrounding the spring ring is drawn downward by the suspension lines 10 so that the skirt will catch and retain sufficient air to insure effective action of the pilot chute as an air anchor for drawing the main parachute canopy from the pack in which it is folded.

In constructing the pilot chute illustrated the piano wire of which the ring is formed is coiled upon itself in two or more turns and the ends of the wire are secured together as shown at 14. The resulting spring ring is then enclosed within the tape 12 which serves as a housing within which the turns of wire may slip and move without injury to the fabric of the canopy. The resulting assembly is then placed centrally on a

flat square of fabric which is to form the canopy and the tape of the ring assembly is stitched to the fabric of the canopy. The suspension lines 10 are secured to the fabric of the canopy either before or after the ring assembly is attached to the web. The suspension lines preferably terminate adjacent the ring 6 and extend diagonally therefrom through and beyond the corners of the web so that they may be used for securing the pilot chute to the peak of the main parachute with which it is to be used. The suspension lines may extend from one corner of the canopy through the connection 18 and back to the diagonally opposite corner of the canopy if desired.

After the suspension lines have been secured in place the corners are preferably folded inward and the material on opposite sides of each line is secured together by stitching along the lines 20 to form a cup-shaped, air retaining skirt as shown in Fig. 4. When so stitched the pilot chute is completed and ready for use.

While the pilot chute is preferably formed as shown and described it will be evident that the fabric sheet forming the canopy may be of any desired shape or fashioned in any suitable manner to permit retention of the central portion bounded by the ring in a substantially flat and tensioned condition to prevent interlocking of the turns of the ring when the parachute is collapsed or folded. It will also be apparent that the suspension lines may be varied in number and secured to the pilot chute in any desired manner. In view thereof it should be understood that the particular embodiment of my invention herein shown and described is intended to be illustrative only and is not intended to limit the scope of my invention.

I claim:

1. A pilot chute comprising a seamless rectangular web of fabric having a flexible spring ring attached thereto and located centrally with respect to said web, said ring normally tending to assume a flat circular form and serving on release of the pilot chute to maintain the material bounded by said ring in a substantially flat form but being foldable to a collapsed form for packing, and suspension lines secured to said web and extending diagonally through the corners thereof and beyond the edges of the web for securing the pilot chute to another parachute.

2. A pilot chute comprising a seamless rectangular web of fabric having a flexible spring ring attached thereto and located centrally with respect to said web, said ring normally tending to assume a flat circular form and serving on release of the pilot chute to maintain the material bounded by said ring in a substantially flat form but being foldable to a collapsed form for packing, and suspension lines having the ends thereof secured to said web adjacent said spring ring and extending diagonally through the corners of said web and beyond the edges thereof for securing the pilot chute to another parachute.

3. A pilot chute comprising a seamless rectangular web of fabric having a flexible spring ring secured thereto and positioned centrally of the web and spaced from the edges thereof, said spring ring normally tending to assume a flat circular form and serving to maintain the material bounded thereby in a substantially flat form, suspension lines secured to said web and extending diagonally through the corners of the web and beyond the edges thereof for attaching the pilot chute to another parachute, the ma-

terial of said web on opposite sides of each of said suspension lines being secured together and serving to hold the portion of the web surrounding said ring in the form of an air retaining skirt.

4. A pilot chute comprising a seamless rectangular web of fabric having a flexible spring ring secured thereto and positioned centrally of the web and spaced from the edges thereof, said spring ring normally tending to assume a flat circular form and serving to maintain the material bounded thereby in a substantially flat form and under tension sufficient to prevent interlocking of turns of the ring when the ring is twisted into the form of a figure 8 and the resulting turns are folded into overlapping relation, suspension lines secured to said web and extending diagonally through the corners of the web and beyond the edges thereof for attaching

the pilot chute to another parachute, the material of said web on opposite sides of each of said suspension lines being secured together and serving to hold the portion of the web surrounding said ring in the form of an air retaining skirt.

EMRY VERNE STEWART.

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