Aug. 4, 1931. J. L. BROWN, JR 1,816,927

PARACHUTE

Filed Sept. 1, 1928 3 Sheets-Sheet 1

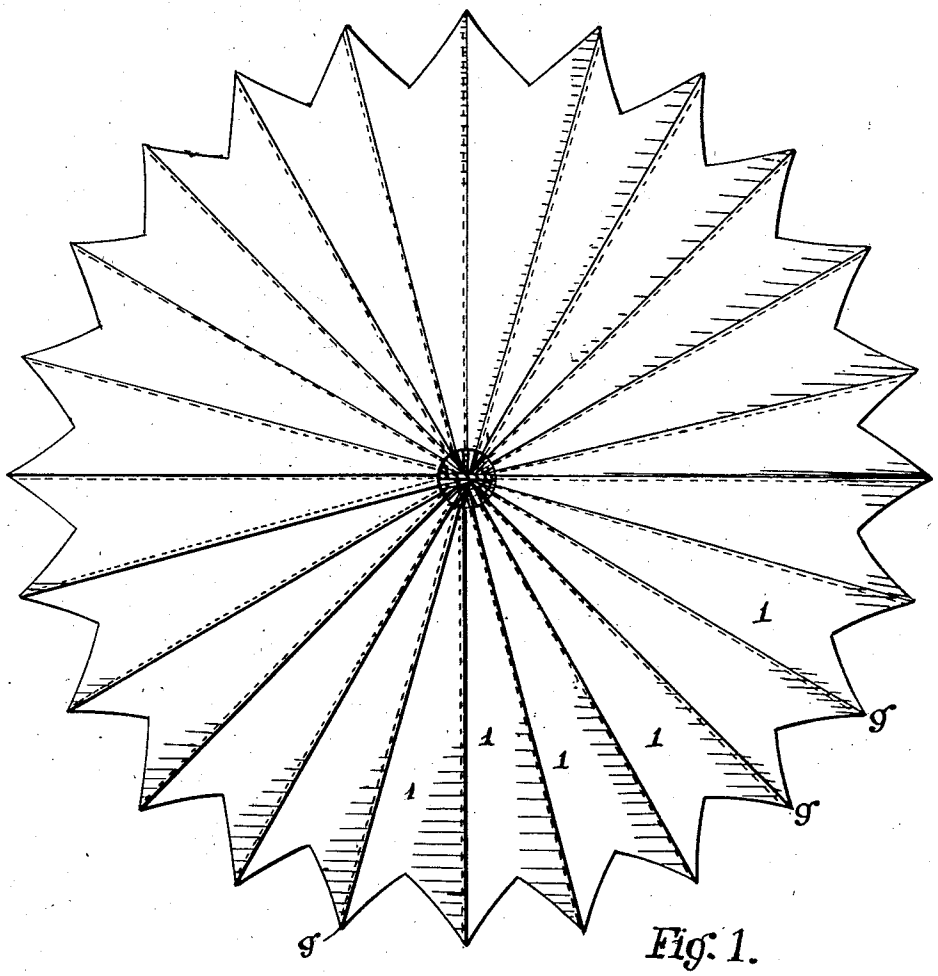


Fig. 1.

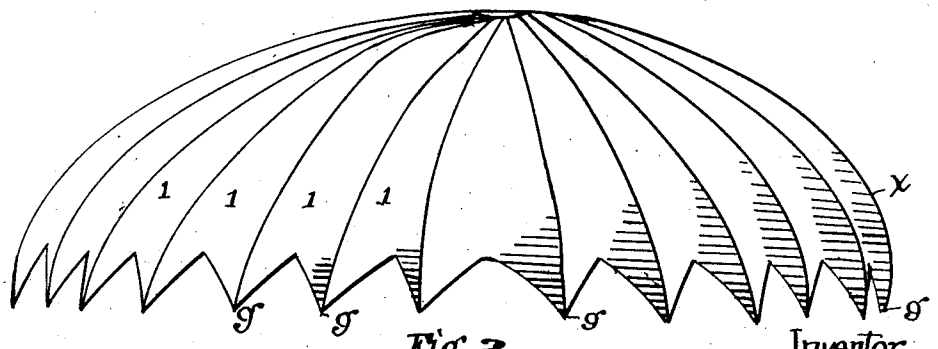


Fig. 2.

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Aug. 4, 1931. J. L. BROWN, JR 1,816,927

PARACHUTE

Filed Sept. 1, 1928 3 Sheets-Sheet 2

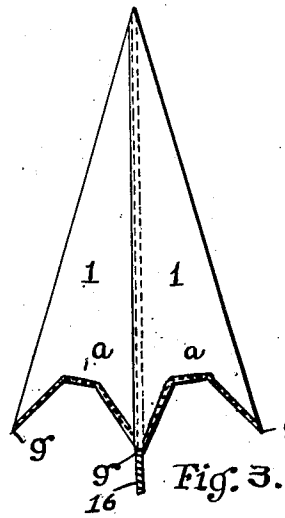


Fig. 3.

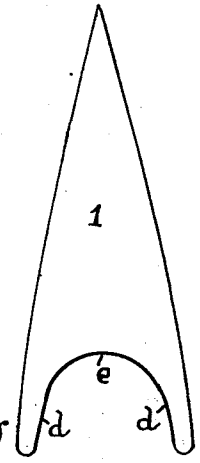


Fig. 4

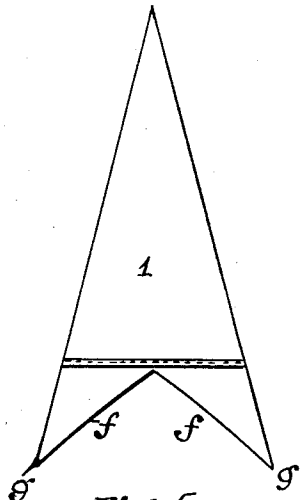


Fig. 5.

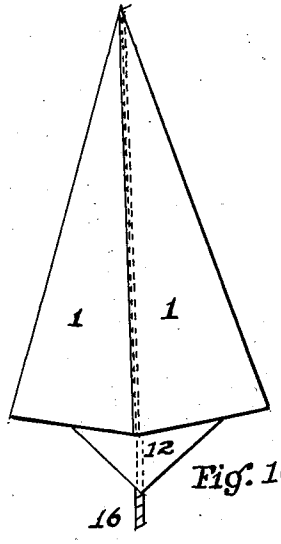


Fig. 10

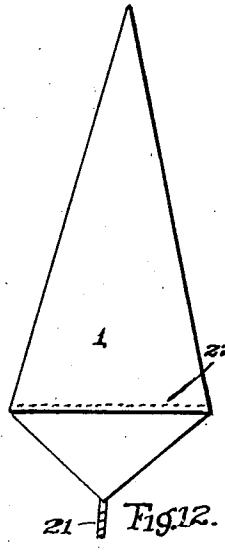


Fig. 12.

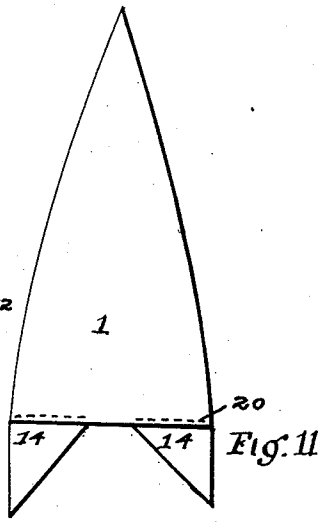
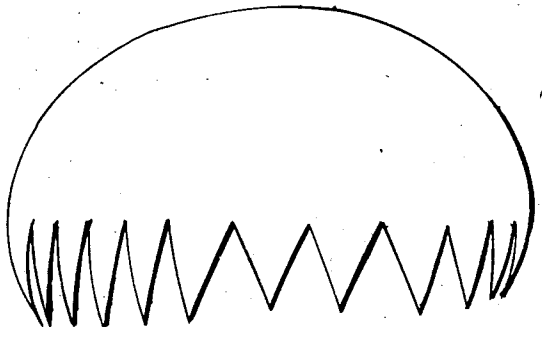


Fig. 11


Fig. 9.

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Aug. 4, 1931. J. L. BROWN, JR 1,816,927

PARACHUTE

Filed Sept. 1, 1928 3 Sheets-Sheet 3

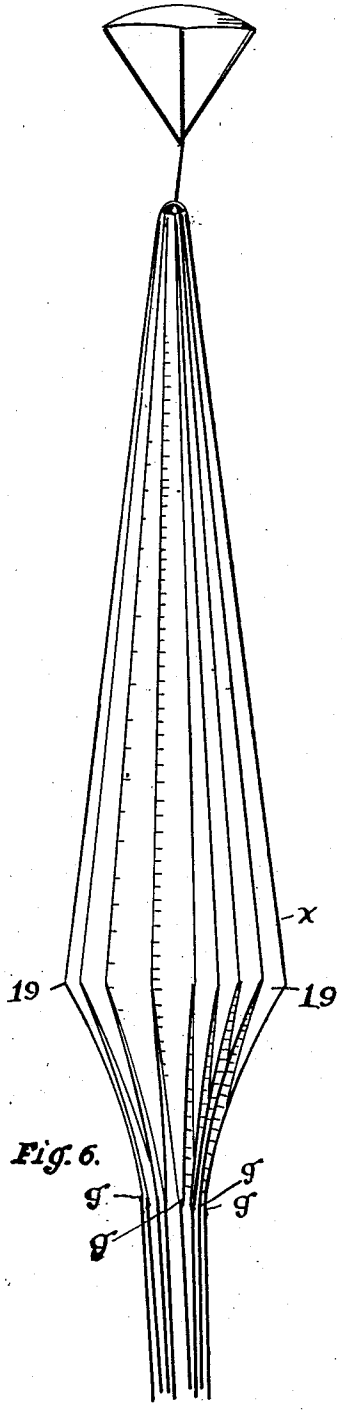


Fig. 6.

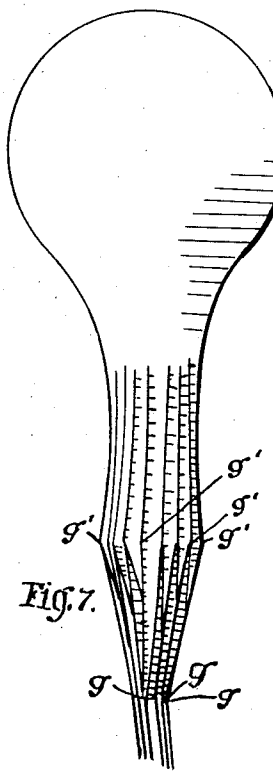


Fig. 7.

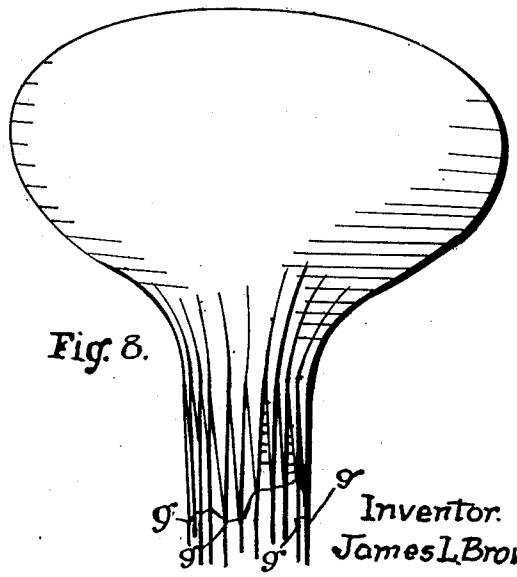


Fig. 8.

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1,816,927

UNITED STATES PATENT OFFICE

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PARACHUTE

Application filed September 1, 1928. Serial No. 303,525.

The present device has amongst other objects, the preventing of the peripheral edge of the parachute from flapping over thereby precluding or hindering the entrance of air into the interior of the parachute; also the prevention of the constriction of the mouth of the parachute through the entanglement of the folds of the sail with the suspending lines; expediting the inflation of the parachute by increasing the length of the peripheral edge of the sail.

When the present parachute is inflating, the pilot parachute being at the apex of the main parachute and the load being at the lower end of the suspending lines, no tension is transmitted to the material of the sail at the peripheral edge, between any two adjacent lines. The radial lengths between the apex of the sail and its peripheral edge measured along the fabric of the sail vary, when measured from different portions of the peripheral edge of the sail. These lengths are less when measured from points on the peripheral edge between the points of junction of the load lines with the sail than when measured at the load lines. A recession of the edge of the fabric inward from the line of a circle drawn from the apex of the sail as a centre and the radial distance from the apex to the point of junction of the load line and the sail occurs, the radial length of the fabric itself being permanently less at the intermediate points. This construction forms what is technically known as a cut back, lengthening the peripheral edges of the sail between the load lines, lifting the portion of this peripheral edge while the parachute is strung out and being inflated, and hence getting it out of the way of the lines, and making the peripheral edge at the parts of it between the points of junction of load lines, during the period of this stringing out, run much more vertically than in the circular parachute, hence avoiding the flapping over of the loose portion, and giving the entering edge as the peripheral edge of the sail is called when the parachute is in this situation, a more perpendicular form, which results in the formation of many loops for the entrance of air (very certainly and immediately formed) at the peripheral edge, and these multiple loops form always open mouths projecting radially from the axial line of the parachute that are always ready to receive the air when the parachute is strung out thus speeding up the inflation, and, if entanglement should occur in the rigging, such fouling does not prevent the entrance of air into the interior of the sail because these multiple mouths are situated above the point to which the rigging can possibly foul.

The point of major flexion of the arc extending from the peripheral edge to the apex of the sail is brought nearer in the present device, to the peripheral edge by the use of these cut backs in the periphery thus increasing the flying diameter. It also tends to prevent oscillation in flight by lowering the center of gravity and providing by means of the cut backs in the periphery for an escape of the over pressure of air at a point above the ordinary point at which air escapes from other parachutes.

In accomplishing these purposes I make the sail with the periphery cut back either between the adjacent suspending lines or between the center lines of the gores or other point on the periphery so that the sail is longer radially at one point than at another. This construction can be accomplished in a number of ways. Either the gore itself can be cut back between the suspending lines or a configuration can be given similar to that which would be formed by a series of such gores through attaching to the peripheral edge of the parachute auxiliary portions of sail which may be done in a number of ways.

The particular shape of this cut back need not be limited to any specific form. The various forms in which it can be shaped are very numerous and some of them, those that I consider at present the best, I will describe in the following portions of my specification and the advantages of these various forms will be at the same time set forth. Describing now what I regard as the best forms of my device: Fig. 1 illustrates a plan view of my parachute. Fig. 2 is a side

elevation of the same. Fig. 3 is an elevation of two adjacent gores stitched together. Fig. 4 is an outline of another shape of gore. Fig. 5 is an outline of still another shape of gore. Fig. 6 is a sketch showing a strung out parachute, the apex being supported by an auxiliary parachute, the lower edge of the main parachute being drawn down by the load cords, and the multiple air receiving mouths being shown in the position they will occupy when the parachute is strung out. Figs. 7–8–9 picture the progressive stages of opening showing that in the earlier stages of inflation the true value of the multiple mouths is realized. Fig. 10 shows a form of the present parachute where the cut back is formed by attaching to the peripheral edge an auxiliary portion of the sail extending over a portion of the two adjacent gores and over the suspending cord. Fig. 11 the cut back is formed by two pieces of auxiliary sails that do not cross the suspending cord. Fig. 12 shows a cut back by attaching an auxiliary panel and additional rigging.

The parachute sail is composed of gores, 1, 1, the radial edges of which are secured together in the usual way, the upper part of the load cord, 16, being contained in the seam. This is a standard form of parachute construction, but any other suitable construction can be adopted. The points, *g*, *g*, of emergence of the load cord, 6, are shown at the lower points of the gore between which is the entering edge of the parachute when the parachute is strung out. I will proceed now with the description of the parachute as it is operated when strung out. The periphery of the parachute sail is formed by the entering edges of the various gores or the panel attached thereto. Between these points, *g*, *g*, the entering edge of the gores retreats to give the desired contour to the mouth by which the air enters into the inside of the sail so that the tendency of the fold to flap over on the adjacent flap will be largely or entirely eliminated, the mouth opening enlarged and the trapping of the air facilitated. In the contour shown in Fig. 3, the entering edge of the gore had the straight slopes, and the straight horizontal edge, *a*. In Fig. 4 the slope is a continuous curve with the side slopes, *d*, *d*, and the upper part, *c*, of the entering edge also curved. In Fig. 5 the entering edge has two slopes, *f*, *f*, that meet in a point. The lower reinforcement of the cord may follow the contour more or less exactly, or go straight across the gore. In Fig. 3 the reinforcement follows the contour of the mouth. In Fig. 5 the reinforcement follows the contour to an extent, in Fig. 5, the reinforcement goes straight across.

The depth to which the gores are cut in is sufficient to prevent the parts, 19, of the sail from projecting too far at its entering edge when the parachute is strung out, so that the flapping over of the part, 19, of the fold will be avoided. The inner peak of the cut in should be sufficiently removed from the points, *g*, *g*, to make given slopes *c*, *c*, *d*, *d*, and *f*, *f*, a large angle with the horizontal so that a large mouth will be provided. The horizontal portions, *a* and *e*, cause the upper part of the mouth to spread and trap more air.

The parachute, when strung out, as shown in Fig. 6, has the mouths in the folds, 19, (marked in this figure and in Fig. 7, 10 and 11,) undivided and spread open at the top slightly more than at the bottom. As they project comparatively slightly beyond the points *g*, *g*, the exterior air friction, when the parachute is retarded, is exerted on the entering edge above the points, *g*, *g*, and the tendency is to push the fabric of the folds upwards, and not to flap them. The long line of the entering edge along the cut is almost vertical and the tendency of the rushing in air is to keep it so and keep the fabric along the folds vertical instead of bending it over, as it would do with the entering edges horizontal or have only the slight inclination they would have were the peripheral edge of the sail circumferential. The mouth is thus held open. The mouth is also much longer than in the standard form of parachutes. It will also be noted (see Fig. 6) that the point of major flexion will be near the point *x* which is much nearer the peripheral edge than the point of major flexion in other parachutes when fully inflated. This gives a much greater supporting surface for the same square feet of area of the sail.

Substantially the same structure can be produced by sewing to the entering edge of the standard parachute wings such as 12, in Fig. 10. As illustrated in this figure, the wing 12, is a triangular piece of fabric that extends over parts of the lower edge of two adjacent gores and over the load cord, 16. The wing is attached to the gores by stitching. In Fig. 11, a pair of triangular wings, 14, 14, are attached to the bottom of the gore by the stitching, 20. In Fig. 12, the wing is a triangular piece sewed to the bottom of the gore having its point projecting downwards and having attached to this point one or more auxiliary cords, 21, which may run either to the harness or to the load cords.

I do not confine myself to the particular forms of structures above set forth, and my invention is not to be limited to less than set forth in the claims that follow when fairly construed.

I claim:—

1. A parachute provided with gores having a series of mouths formed by the enter-

ing edge of the periphery, the size of said mouths being increased by inclining their bounding lines at places to the centre line of the gores.

2. The device as claimed in claim 1, wherein the said mouths have the upper portions of their bounding edges more horizontal than the lower portion of the same.

3. The device as claimed in claim 1 wherein the upper portions of the mouths are situated when the parachute is strung out above the upper part of the rigging, whereby the entrance of air into the parachute will not be retarded should the rigging become entangled.

4. A parachute having a sail composed of gores made of a woven fabric, said sail containing gores in which the edges of the fabric forming the same, where said edges form a portion of the peripheral edge of the sail, have the edges of said fabric indented toward the peak of the parachute sail.

5. In a parachute having a sail formed of gores of woven fabric, a gore in which the peripheral edge of the fabric of the gore is indented and lies back of a line extending between the points where the peripheral edge of the gore and the seam edge of the gore meet, when said gore is laid flat.

6. A parachute in which the sail is formed of a series of gores seamed together at their adjacent edges and having the load cords extending along the seams between the said gores, and sewed therein, from the apex of the parachute to the periphery of the sail, and extending from the periphery of the sail directly to the load; said sail having the distance from the peripheral edge thereof to the apex thereof, measured along said load cords, substantially greater than the radial distance between the peripheral edge of the sail and the apex, measured radially along said gores, at points between the seams uniting the edges of the adjacent gores to each other.

7. A parachute in which the sail is formed of a series of triangular gores two of the sides of which gores are much longer than the other side, and where this third side of said gores forms a portion of the circumference of the parachute sail, and having the adjacent long sides of said gores united to each other by a seam, and having the load cords extending, radially of sail, from the apex to the circumference of the sail, and being contained in said seam and extending directly from the circumference of the sail to the load, and in which the third side of said gores, recedes, between the points on the circumference of the sail at which the load cords emerge from the said seams, thereby forming an upwardly extending mouth, the middle portion of which lies nearer the apex of the sail than do the edges of said mouth nearer the said seams between the said gores.

8. The device as defined in claim 6, wherein the slanting of the edge of the parachute thereby produced, largely increases the length of the opening edge of the sail.

9. A parachute having a sail composed of triangular gores seamed together by a seam connecting adjacent edges thereof, and having load cords extending from the apex to the circumference of the sail and sewed into the seam between the adjacent gores; the length of the peripheral edge of said sail being largely increased by giving the edge of the gores lying between the the points of emergence of the load cords from said seams a slanting direction towards the apex of the parachute when the gore is laid out flat.

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