

May 5, 1964

D. C. JALBERT

3,131,894

MULTI-CELL GLIDE CANOPY PARACHUTE

Filed Jan. 10, 1963

4 Sheets-Sheet 1

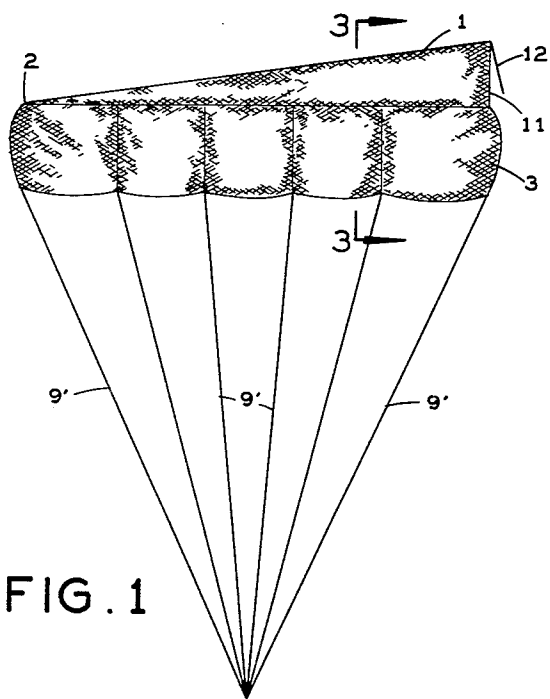


FIG. 1

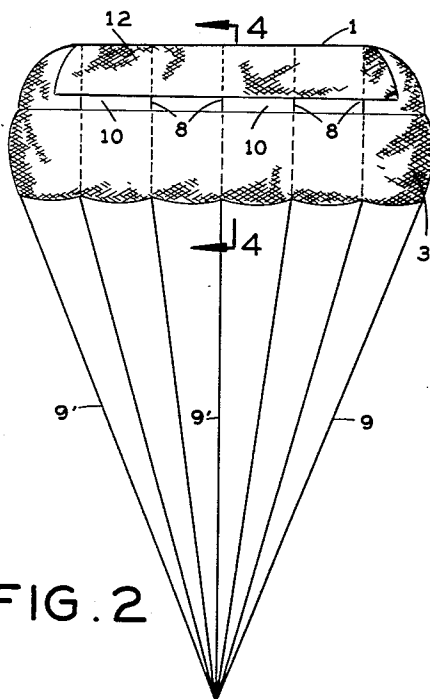


FIG. 2

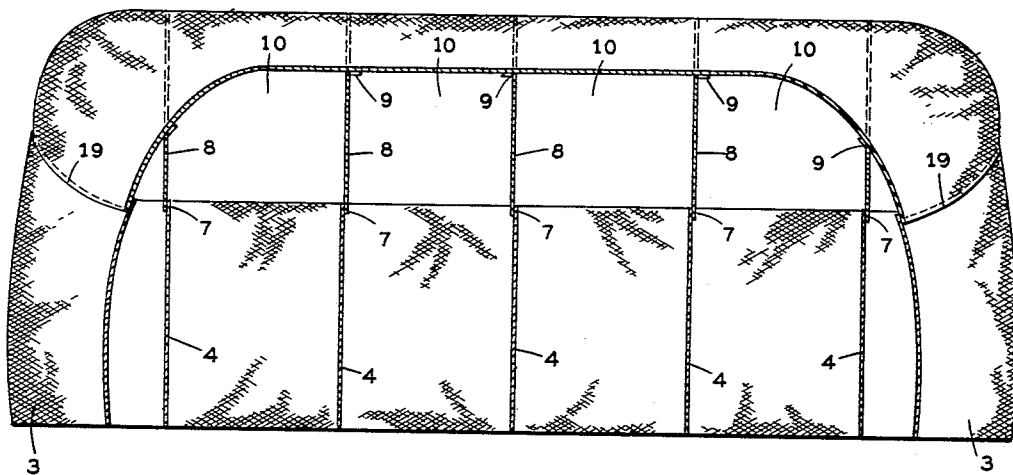


FIG. 3

INVENTOR
DOMINA C. JALBERT

BY

James W. Lyles

ATTORNEY

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D. C. JALBERT

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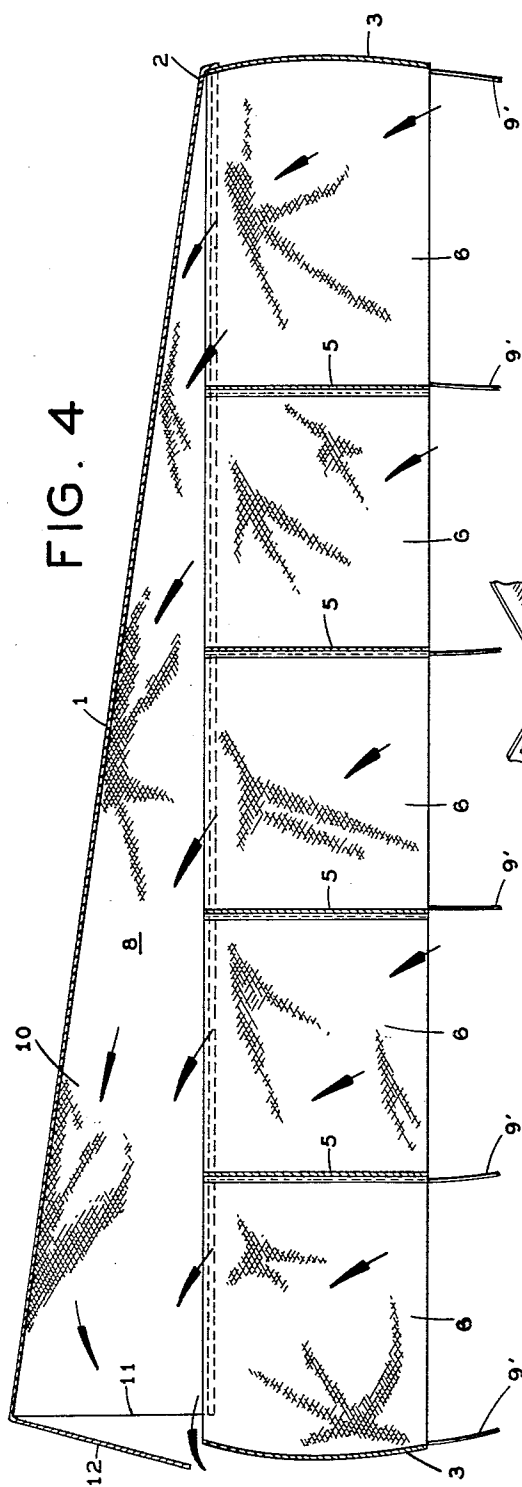
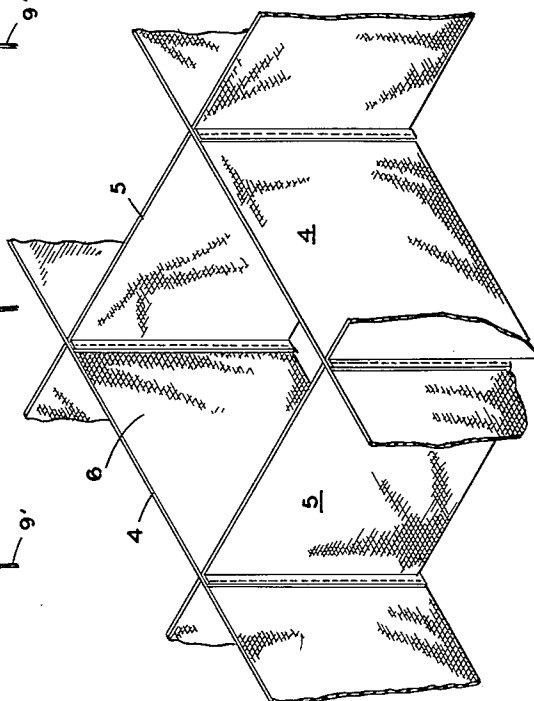


FIG. 5



INVENTOR
DOMINA C. JALBERT
BY *James S. Gale*
ATTORNEY

May 5, 1964

D. C. JALBERT

3,131,894

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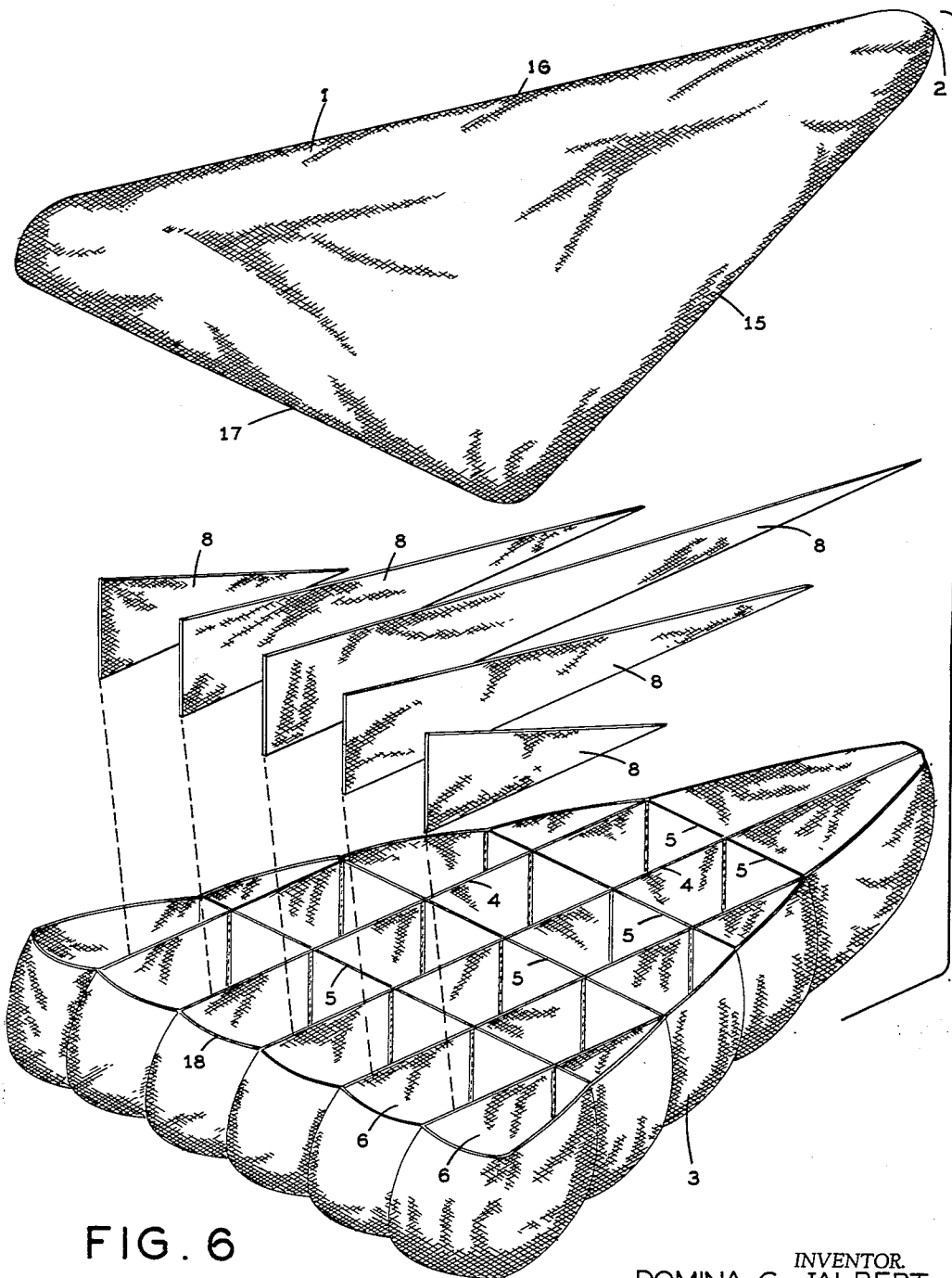


FIG. 6

INVENTOR
DOMINA C. JALBERT

BY

James H. Dyer

ATTORNEY

May 5, 1964

D. C. JALBERT

3,131,894

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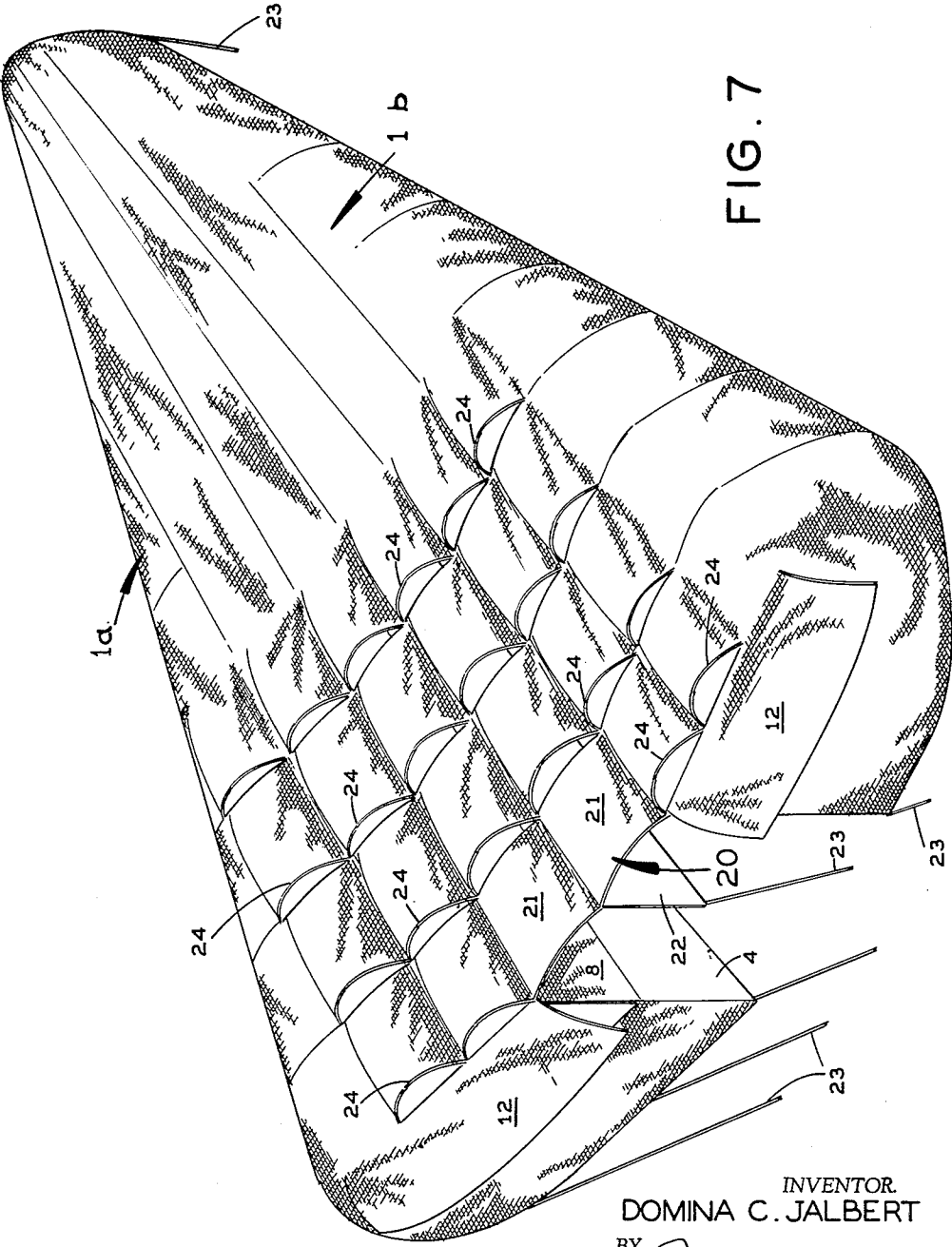


FIG. 7

INVENTOR
DOMINA C. JALBERT
BY *James H. Ayer*
ATTORNEY

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3,131,894

MULTI-CELL GLIDE CANOPY PARACHUTE
Domina C. Jalbert, 140 NW. 26th St., Boca Raton, Fla.
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8 Claims. (Cl. 244-145)

This invention relates to parachutes, and more particularly to one in which efficiency in operation and use is materially increased and controllability in flight is rendered more effective.

It is an object of the invention to provide a parachute in which the under side of the canopy is provided with a plurality of cells which are open at the bottom and which communicate at their upper ends with longitudinal air flow channels located under the canopy and having air outlets or vents at the rear end of the parachute.

It is an object of the invention to provide airflow controlling means at such outlets and by which various turning effects of the parachute are possible to thereby control flight direction and landing.

More particularly, the invention contemplates the provision of a parachute having a substantially triangulated or wedge-shaped canopy top, which top assumes a flattened and slightly dished form in flight; the under or concave lower side of the canopy top and an attached peripheral skirt forming a construction that is interiorly divided by crossed partition strips into a plurality of cells, to the upper end of some of said partition strips are provided attached vertical dividing panels forming air channels between them and which channels open at the rear of the canopy and constitute outlets for the air flowing upward through the cells. Movable flaps or other air-controlling means are provided at said outlets and by the employment of such controls the air flow through selected outlets can be regulated and steering control of the parachute is thus obtained.

With these and other objects to be hereinafter set forth in view, I have devised the arrangement of parts to be described and more particularly pointed out in the claims appended hereto.

In the accompanying drawings, wherein an illustrative embodiment of the invention is disclosed,

FIG. 1 is a side elevational view of a parachute constructed in accordance with the invention;

FIG. 2 is a rear elevational view, as seen from the right of FIG. 1;

FIG. 3 is a sectional view, taken substantially on the line 3-3 of FIG. 1, looking in the direction of the arrows;

FIG. 4 is an enlarged sectional view, taken substantially on the line 4-4 of FIG. 2, looking in the direction of the arrows;

FIG. 5 is a perspective view, showing the partitioning strips which form the cells under the canopy;

FIG. 6 is an exploded view of the parts of the parachute, and

FIG. 7 is a perspective view of a modified form of the device.

The body or canopy top of the parachute consists of a substantially triangular or wedge-shaped piece of air-imperious material or fabric 1, of which the forward or front end consists of the substantially pointed terminal 2. Secured to the perimeter of the canopy top 1, and along its converging or side edges 15 and 16, and by means of the stitching 19, and dependent from the canopy top 1, is an encircling skirt or side wall 3. The top edge 18 of the rear part of the skirt 3 is not attached to the rear edge 17 of the top 1. Located beneath the top 1 and surrounded by the skirt 3 and attached to the skirt is a plurality of longitudinally-extending strips 4 of fabric or the like, constituting partitioning members, these strips being crossed by similar strips 5, thus resulting in the

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production of a honey-comb effect of cells 6 within the interior of the parachute.

Secured to the tops or upper ends of the longitudinal partition strips 4, by the stitching 7, is a plurality of triangular or wedge-shaped fabric or sheet material pieces or dividers 8, which pieces have their upper edges secured at 9 by stitching or otherwise, to the under side of the canopy top 1. As will be noted in FIG. 6, these triangulated or wedge-shaped dividing strips vary in length, the same being graduated in length from the shortest at the opposite sides of the canopy top 1, to the longest located at substantially the longitudinal center line of the canopy top. Thus, when the canopy top is attached to the upper edges of these dividing pieces 8 and at its edges 15 and 16 to the side wall skirt 3, the top 1 will assume a flattened but shallow concavo-convex formation, as is clearly shown in FIG. 3. The shroud lines 9' for the parachute are attached at the junctions of the partition members 4 and 5 with the skirt 3, and these lines extend in the conventional manner, to the parachute harness.

The arrangement of the various parts of the parachute is such that the cells 6, formed by the criss-crossed strips 4 and 5, are open at their lower ends and at their tops, and when the parachute is in flight, the air will pass upwardly through these cells, as indicated by the arrows in FIG. 4, and will flow upwardly and rearwardly toward the wider rear end of the canopy top 1, thus flowing through channels 10 provided under the canopy top between the triangulated dividing strips 8. Each of the channels 10 is open at the rear of the parachute, or has an outlet 11 between the canopy top 1 and the edge 18 of the skirt 3, so that the air flowing through the channels 10 will pass out through these openings 11. These outlet openings 11 may be provided with flaps or curtains 12 or other closure means, and cords extending therefrom and under the control of the parachutist can be attached to these flaps. By means of such an arrangement, some or all of the outlet openings 11 can be either partly or completely closed, which action will restrict in varying degrees, the amount of air permitted to escape from the various cells 6. For example, by closing off the openings 11 on one side of the longitudinal center line of the canopy, thrust will be developed which will turn the parachute. Also, if all of the outlet openings 11 are closed by pulling down the flaps 12, the parachute will lose most of its translational velocity and will descend similarly to a parachute of standard construction.

Referring now to FIGURE 7, the parachute 1, as previously illustrated in FIGURES 1-6 is divided longitudinally to form sections 1a and 1b. The same criss-crossed strips 4 and 5 and the triangulated dividing strips 8 are the same as the construction previously described. The sections 1a and 1b are shifted apart and a triangular insert 20, which embodies the same fabric as top 21, is stitched along its marginal edges to the edges of the sections 1a and 1b. A stabilizing web 22 extends for the full length of the insert 20 and this web is formed of fabric or other desirable material and may be possibly braced by criss-crossed webbing strips between the web 22 and the sections 8. The strip 22 is provided at a plurality of points in its length with shroud lines 23. To constitute air relief means the canopy in each longitudinal channel as defined by the strips 8, are provided with a plurality of air escape openings 24, whereby to relieve excessive pressure beneath the canopy that would cause the canopy to explode and these relief openings 24 are dimensioned in manufacture in accordance with the relief of air necessary for various uses of the parachute. The air relief openings 24, as shown in FIGURE 7 may obviously be employed in the structure illustrated in FIGURES 1-6.

The use of this form of the invention provides a very

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desirable structure whereby the parachute may be effectively controlled in lateral movements and in glide action and the insert 20 effectively provides a very desirable glide attachment. In addition to the relief openings 24, the channels 10 for each section 1a and 1b may be provided with the closure flaps 12, functioning substantially identical to the first form of the device. Structurally, the showing in FIGURE 7 is substantially identical to that described in the first form of the invention but, for excessive loads upon the shroud lines and for a better gliding control, the insert 20 has been employed.

From the foregoing, the construction and operation of the improved parachute will be readily apparent. The inflation of the parachute takes place in the manner similar to the conventional type. The upper ends 13 of the transverse cell-forming partition strips 5 are not attached to the canopy top 1, and are located well below the same. This allows the air, entering into the cells 6 through the open bottoms thereof, to reach and unrestrictedly flow through the channels 10 located between the vertical division strips 8, and then flow out through the rear outlets 11 of the channels. The upper surface of the parachute is maintained in the relatively flat-top form shown in FIG. 3 while in flight, and by regulation of the closure flaps 12, the outflow of air can be controlled to turn the parachute and regulate its flight and landing.

Having thus described a single embodiment of the invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

What I claim is:

1. A parachute comprising a canopy consisting of a top in substantially wedge-shaped form having a dependent peripheral skirt attached at its upper end to parts of the periphery of the top, the interior of the canopy being divided into a plurality of cells open to atmosphere at the bottom, the walls of some of the cells being extended upwardly and meeting and being attached to the under side of the canopy top, said extended parts of the cells forming air-flow channels between them, said channels being open at one end for air exit, the air entering the lower ends of the cells tending to flow upwardly through the channels and flow out of the open ends of the channels.

2. A parachute as provided for in claim 1, wherein movable flaps are provided at the open ends of the channels to thereby control the air flow therefrom.

3. A parachute as provided for in claim 2 wherein the parachute is formed of two substantially identical sections that are connected at a leading end, the sections from their point of connection being divergent to form a wedge shaped opening, an insert of triangular shape disposed within the opening and connected to the sides of the parachute sections, the said insert being provided with a depending stabilizing fabric fin and with the insert being entirely open at its trailing end, the said insert having a canopy top substantially identical to the canopy

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top of the two divergent sections, the said stabilizing fin being connected to shroud lines and whereby to maintain the fin in a position to form airflow channels.

4. The structure according to claim 3 wherein the canopy for the divergent sections and the insert are provided with air escape openings throughout their major length and with the openings being disposed over the several channels.

5. A parachute comprising, a canopy composed of a substantially triangular top and an attached side skirt, a plurality of crossed sheet material strips located within the canopy and forming the interior of the canopy into a plurality of cells, all of said cells being open at the bottom for air entry, a plurality of triangularly-shaped division strips located below the canopy top and connected to the upper ends of some of the cell-forming strips, said division strips forming air-flow channels between them, which channels extend for the length of the canopy, the rear end of the canopy being elevated by the division strips thereby spacing it above the upper end of the skirt to provide air outlets for each of the channels.

6. A parachute as provided for in claim 5, wherein the division strips vary in length, the canopy being closed at one end, the air-outlet openings being located at the opposite end, and shroud lines attached to the canopy at the junctions of the cell-forming strips with the skirt.

7. A parachute as provided for in claim 5, wherein flaps are provided at the air-outlets to control the air flow therefrom, the divisional strips varying in length, and some of the partition strips extending cross-wisely of the canopy and having their upper edges located below and spaced from the under side of the canopy top.

8. A parachute comprising, a triangulated sheet material piece forming the canopy top, a plurality of spaced, vertical division strips secured to the under side of said top, a side wall-forming skirt attached to converging edges of the canopy top and unattached to the rear edge of said top, the upper edge of the skirt at the rear of the top being spaced below said rear of the top, a plurality of spaced longitudinal partition strips attached to the lower edges of the division strips and attached at their forward and rear ends to the skirt, transverse partition strips crossing the longitudinal strips and co-operating therewith in forming open-bottom cells, the upper edges of the transverse partition strips being disposed below the top of the canopy and spaced therefrom.

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