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COMPLETE SPECIFICATION.

Improvements in Flying Machines.

I, GUSTAV VOIGT, of 13B, Barnimstrasse, Stettin, Germany, Architect, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

- 5 Flying machines have been proposed in which a hollow conical or fish belly like supporting body is arranged underneath the wing-shaped supporting surfaces or planes, or in which the lower or front wall of the supporting body is inclined rearwardly.

- Now according to the present invention a hollow front body is applied which
10 aims at the automatic maintenance of the equilibrium of the flying machine and ensures a straight instead of an undulating path or flight.

The invention is illustrated in the accompanying drawings in which:—

Figure 1 is a side view of one arrangement of flying machine according to this invention,

- 15 Figure 2 a front view of the machine,

Figure 3 a plan of the machine,

Figure 4 is a section on line *c b*, Figure 3, to a smaller scale through the upper supporting surface or plane and,

Figure 5 is a cross section of the hollow front body.

- 20 Figure 6 is a perspective view of a modified arrangement.

Figure 7 a transverse section of Figure 6 and,

Figure 8 is a plan to a larger scale showing the left hand half of the apparatus extended and also the entire frame of the apparatus in the folded condition.

- Figure 9 is a plan view of another modification in which the stretchers on
25 the left hand side of the machine extend beyond the edges of the supporting surfaces, and on the right hand side, as an example, extend only as far as the edge,

Figure 10 is a transverse section of the hollow space with umbrella-like stretchers, and,

- 30 Figure 11 shews the machine in a folded condition, and,

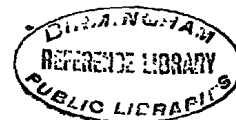
Figures 12 and 13 shew two other modified forms of the flying apparatus with parallel longitudinal axes.

- In all the modifications shown the hollow body consists of the forward part of the long principal supporting surface *a b c*, Figure 3, and of a shorter
35 surface *g f* which is inclined downwardly and rearwardly from the surface *a b c* and in cross section is either flat or curved upwards. The surface *g f* intersects the principal supporting surface *a b c* and is combined therewith by means of lateral vertical walls *d* and *e*. The rear of the hollow space may be closed or open as desired.

- 40 The peculiar air currents produced during flight by reason of the above formation of the supporting surface act so as to produce equilibrium of the apparatus. Such a supporting surface may be applied to gliders as well as to aeroplanes provided with motors.

- Furthermore this supporting surface, because of its radially extended edges
45 from the apex *a* has the practical advantage that it can be made to fold up and extend easily. This advantage is attained by a fixed and constantly strained or tight joint, the ribs or spars and struts being connected to a single handle by which all the parts can be actuated so as to be thrown into and out of the folded and extended condition.

[Price 8d.]



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The folding up and extending of the apparatus can be effected in two ways, that is to say, either according to the constructions shown in Figures 6 to 8, or according to the construction shown in Figures 9 to 11. In Figures 6 to 8 a triangular frame $R \ i^1 \ R^1$ consisting of pairs of struts $i \ k \ R$, $i^1 \ k^1 \ R$ and $i \ k \ R^1$, $i^1 \ k^1 \ R^1$, is shewn above the principal supporting surface $a \ b \ c$ the base and 5 sloping sides of which triangular frame extend beyond the edges of such supporting surfaces, and the transverse side or base R , R^1 of which frame effects the stretching of all sides by means of two pendent columns p and t .

The pairs of struts $i \ k \ R$, $i^1 \ k^1 \ R$ and $i \ k \ R^1$, $i^1 \ k^1 \ R^1$, Figures 6 and 8, are jointed scissors-like at k and k^1 to the side edges $a \ c$, $a \ b$ of the supporting 10 surface $a \ b \ c$ and are connected at the ends i , i^1 , to sliding joints on the longitudinal middle rib $a \ z$, the joint at i being adapted to move towards the front of the machine and the joint at i^1 being adapted to move towards the rear when the device is collapsed. The joint at i may suitably be in the form of a cross- 15 bar m which can move along the central bar or rib $a \ z$ of the frame. The struts meet at R and R^1 where they are held together by means of cords n passing from the free ends of the struts $i^1 \ k^1 \ R$ and $i^1 \ k^1 \ R^1$ over the sheaves l on the struts $i \ k \ R$, $i \ k \ R^1$ and over sheaves at a to the point i^1 , the cord being secured at i^1 by means of any suitable securing device. It will thus be seen 20 that the struts will be held in the extended position so long as the cords are secured at i^1 . If the cords are released at i^1 the struts $i \ k \ R$, $i^1 \ k^1 \ R$ and $i \ k \ R^1$ and $i^1 \ k^1 \ R^1$ are freed at R and R^1 respectively, and by sliding the ends i^1 of the struts $i^1 \ k^1 \ R$ and $i^1 \ k^1 \ R^1$ rearwardly the joint i will be caused to move forwardly and the struts $i \ k \ R$ and $i \ k \ R^1$ will fold towards the rear, 25 revolving on the hinges at k . By this action the pair of struts $i^1 \ k^1 \ R$ and $i^1 \ k^1 \ R^1$ are at the same time forcibly folded towards the front around the point k^1 and the points b and c , Figure 8, move towards the point z . The manner in which the various parts move is clearly indicated by the arrows in Figure 8. The edges of the supporting plane which are jointed at a are drawn to the middle rib in such manner that all the surface edges, inclusive of the 30 edge $s \ o$, Figure 6, of the rudder, close up so as to lie close and parallel to the middle rib $a \ z$. The edge $s \ o$ is revoluble on the point o , Figure 6, which is a fixed joint on the central axis and lies in front of the slidable joint i^1 and when the apparatus is extended this edge $s \ o$ is held in the raised position and the rudder is extended, by means of cords s^1 connected to the edge $s \ o$ at s 35 and forwardly of s to the edges $a \ b$ and $a \ c$ of the supporting plane $a \ b \ c$. The cords s^1 may be considered as under constant tension (when the apparatus is extended), but when the edges of the supporting plane are drawn towards the middle rib $a \ z$ the tension is released and the edge $s \ o$ of the fin folds down, thus collapsing the rudder. The lateral surfaces d and e forming the hollow 40 body also come vertically side by side with the masts or columns p and t , Figures 6 and 7, which are formed with runners at their feet. Figure 7 shows a vertical section in the plane containing the stretcher $R \ R^1$ of Figure 6, the masts $p \ t$ extending above as struts and below as runner supports. When the struts are returned so that the supporting surfaces are extended, the cords or 45 wires s^1 cause the rudder to be unfolded. At the same time the cords or wires t^1 are rendered taut and serve to assist in retaining the rear ends of the side edges of the supporting surface $a \ b \ c$ in the extended position.

Referring to Figure 7 it should be noted that the dotted line illustrates a tension cord or the like for sustaining the sides and upper and lower surfaces 50 of the hollow body. This is a permanent arrangement, the cord being automatically tensioned when the apparatus is extended, and slackened when the apparatus is folded, this cord therefore needing no manipulation.

The second mode of folding the apparatus is illustrated in Figures 9 to 11. Radiating from the longitudinal middle rib $a \ z$ are struts $i \ k$, $i^1 \ k^1$ which struts 55 both in a similar direction *viz.*;—towards the front when the apparatus is to be

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folded, or towards the rear when the apparatus is to be extended, and these struts are connected by a rod from i to i^1 for affording parallel guidance. The struts or stretchers are connected by joints at k , k^1 to the side edges of the supporting surface $a b c$, as shown in Figures 9 and 10, and to the side edge stiffeners and central rib of the lower supporting surface $g f$, as shown in Figure 10. The upper struts may extend only to the side edges of the supporting surface as shown on the right hand side of Figures 9, 10 and 11 or may extend scissors-like beyond the edges of the supporting surfaces $a-c$ or $a-b$ as shown at the left hand side of Figures 9, 10 and 11, so as to stretch the supporting surface outwardly. These extended struts $k-v$ and k^1-v^1 also carry outwards extension pieces of fabric 7, 7 and thus enlarge the weight supporting capacity of the apparatus.

The extended struts are stretched from the point i by means of a cord n^1 passing from the points $v v$ over the sheave at a and rearwards to the sliding joint sleeve i . The sliding joint sleeve at i^1 is made fast by a spring catch for instance, as in an umbrella. When the spring catch at i^1 is released and the sliding joint sleeve is pushed towards a , all the rods $i k$ and $i^1 k^1$ will adjust themselves about parallel with the middle rib. It will be understood that the stretchers or struts $i k$, Figure 10, of the hollow nose or body being jointed umbrella-fashion to the slider at i are all operated to expand such hollow nose or body upon rearward movement being given to the sliding joint sleeve i and are all operated to collapse the hollow body upon a reverse movement being imparted to the sliding joint sleeve i . The tension cord going over the points $v^1 v a$ to i is permanently connected and travels over the guide sheave a backwards and forwards according as the apparatus is to be opened or folded up, thus the cord has not to be fastened or released and pulled in or let out in extending or folded the apparatus as in the previous example.

These two modes of complete folding up are applicable to gliders and offer the advantage that such a flying apparatus is easily and conveniently conveyed from place to place and takes up a limited space.

If this collapsible flying apparatus is to be used in motor driven flying apparatus two parallel longitudinal ribs $a-z$, Figures 12 and 13, are required for carrying the motor. A permanent fixed central part or frame r is thus provided as shewn in Figures 12 and 13 where the lateral foldable parts are shewn. In Figure 10 the edge v is held fast against being bent upwardly by the cord $v k$.

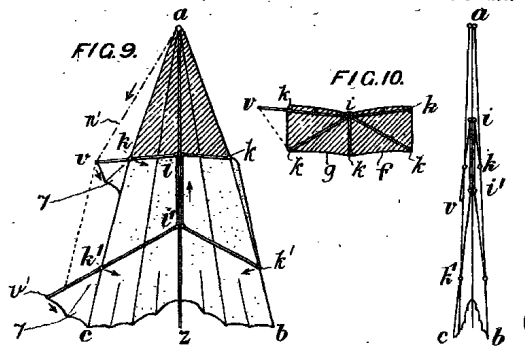
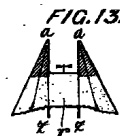
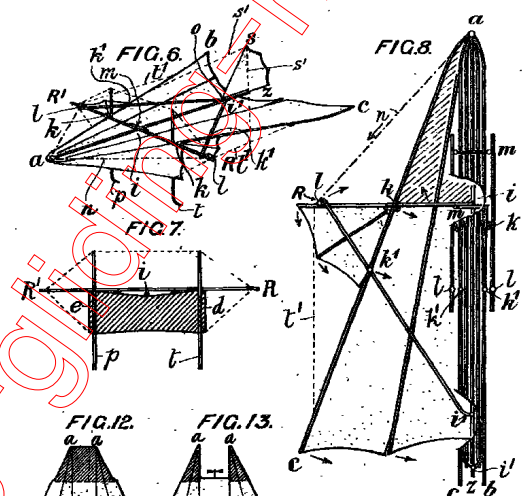
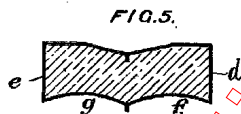
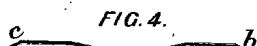
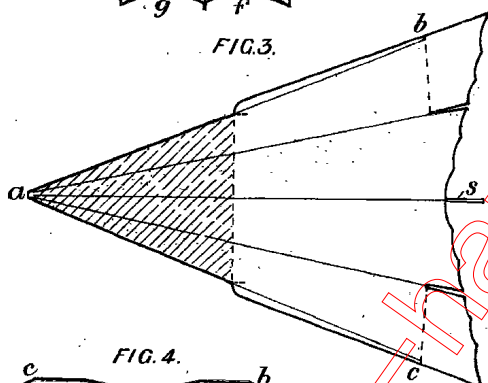
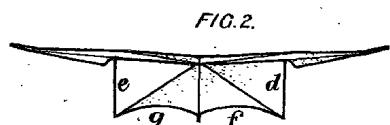
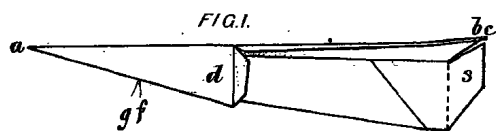
Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

(1). In flying apparatus having under the front part of the supporting surface a hollow body pointed in front and broad at the rear, the arrangement of a hollow body or space consisting of a long principal supporting surface or plane and a short surface inclined or upwardly curved in cross section, which short surface intersects the principal supporting surface and is connected thereto by means of vertical side walls which form the limits of the two surfaces.

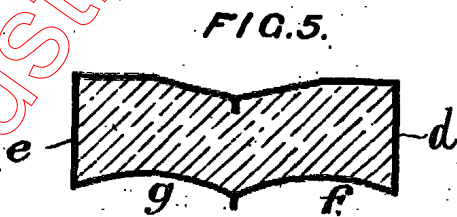
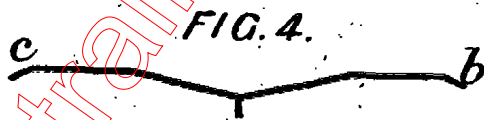
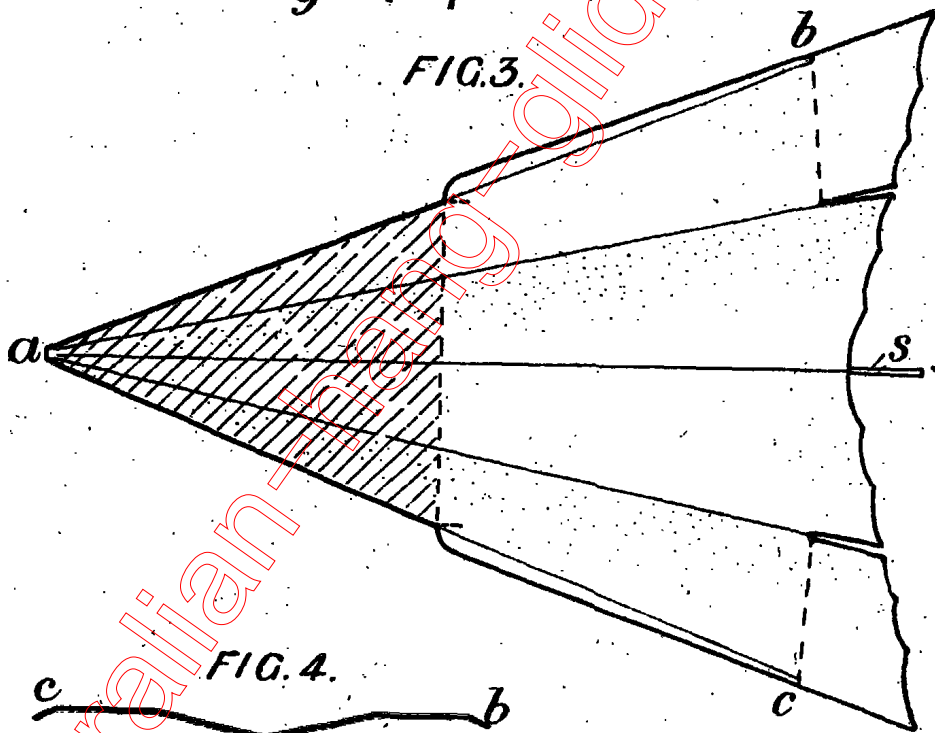
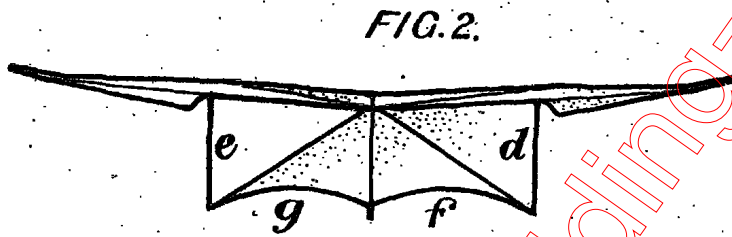
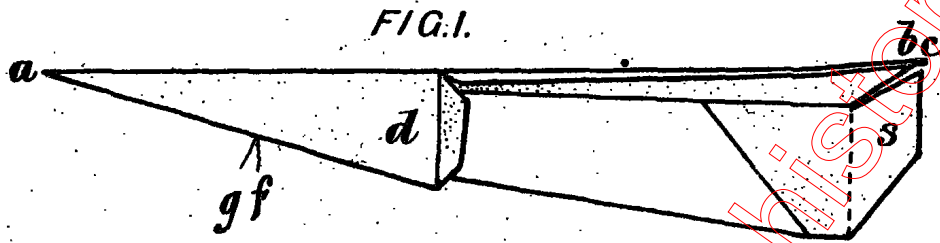
(2). Flying apparatus as firstly claimed in which struts are applied on the longitudinal rib $a z$ of the supporting surface, which struts support the edges of the carrying surfaces or extend beyond the same and can slide on the said rib in the same direction or in the opposite direction when released by a single releasing operation, whereby all the supporting surfaces of the flying apparatus are constrained to fold up simultaneously.

Dated this 30th day of November, 1911.

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Chartered Patent Agents.



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